Federal State Autonomous Educational Institution for Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA NAMED AFTER PATRICE LUMUMBA
RUDN University

Institute of Medicine

(educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

BIOLOGY

course title

Recommended by the Didactic Council for the Education Field of:

31.05.01 General Medicine

field of studies / speciality code and title

The course instruction is implemented within the professional education programme of higher education:

General Medicine

higher education programme profile/specialisation title

2024

1. COURSE GOAL(s)

The goal of the course is to equip students with the knowledge and skills in the field of general biology, parasitology, classical, molecular, and medical genetics, which are necessary for the formation of the scientific worldview and practical activity of the physician.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the Biology course is aimed at the development of the following competences (competences in part): GPC-5.

Table 2.1. List of competences that students acquire through the course study

Competence code	**Competence descriptor**	**Competence formation indicators** (within this course)
GPC-5	Being able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional tasks	GPC-5.1 Mastering the algorithm of clinical, laboratory and functional diagnosis when dealing with professional tasks GPC-5.3 Being able to determine morpho-functional, physiological states and pathological processes of the human body

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective* component of (B1) block of the higher educational programme curriculum.

* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

Table 3.1. The list of the higher education programme components / disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Competence code	**Competence descriptor**	**Previous courses/modules***	**Subsequent courses/modules***
GPC-5	Being able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional tasks	Chemistry	Biochemistry, Normal physiology; General surgery; Obstetrics and gynecology; Microbiology, virology; Oncology, radiation therapy; Pathophysiology, clinical pathophysiology; Microbiological diagnostic methods; Propaedeutics of internal diseases;

Competence code	Competence descriptor	Previous courses	Subsequent courses
			Immunology; Pathological anatomy, clinical pathological anatomy; Radiation diagnostics; Medical elementology; Ophthalmology; Pharmacology; Anatomy; Topographic anatomy and operative surgery; Forensic Medicine; Medical forensics; Otorhinolaryngology; Pediatrics

* To be filled in according to the competence matrix of the higher education programme.

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course is 7 credits (252 academic hours).

*Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)**

Type of academic activities		Total academic hours	Semesters	
			2	3
Contact academic hours		170	85	85
including:				
Lectures (LC)		17	-	17
Lab work (LW)		153	85	68
Seminars (workshops/tutorials) (S)				
Self-studies		46	14	32
Evaluation and assessment (exam/passing/failing grade)		36	9	27
Course workload	academic hours_	**252**	**108**	**144**
	credits	**7**	**3**	**4**

* To be filled in regarding the higher education programme correspondence training mode.

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1	**Topic 1.1.** Characteristics of Life	**LW**
	Topic 1.2. The cell as a unit of life	**LW**

Course module title	Course module contents (topics)	Academic activities types
Introduction to Biology. The cell as a unit of life	**Topic 1.3.** The chemical components of the cell. The structure and functions of the cell membrane.	**LW**
Module 2 Genetic material. Structure and functions of nucleic acids	**Topic 2.1.** Structure and functions of nucleic acids	**LW**
	Topic 2.2. Genes and genetic code	**LW**
	Topic 2.3. DNA replication. PCR	**LW**
	Topic 2.4. Variability of living things. Mutations	**LW**
Module 3 Gene expression	**Topic 3.1.** Structure of prokaryotic genes. Synthesis of RNA molecules (transcription) in prokaryotic cells	**LW**
	Topic 3.2. Structure of eukaryotic genes. Synthesis of RNA molecules (transcription) in eukaryotic cells	**LW**
	Topic 3.3. Processing of RNA molecules	**LW**
	Topic 3.4. Translation in prokaryotic and eukaryotic cells	**LW**
	Topic 3.5. Control of gene expression in prokaryotes and eukaryotes	**LW**
	Topic 3.6. Genetic material of viruses and prokaryotes	**LW**
	Topic 3.7. Genetic material of eukaryotes	**LW**
Module 4 Cell division	**Topic 4.1.** Structure of eukaryotic chromosomes. Karyotype	**LW**
	Topic 4.2. Allelic and non-allelic, linked and non-linked genes	**LW**
	Topic 4.3. Pleiotropic and lethal genes. The concepts of penetrance and expressivity. Types of gene interaction.	**LW**
	Topic 4.4. The cell cycle, mitotic cell division. The control of the cell cycle	**LW**
	Topic 4.5. Meiotic cell division	**LW**
Module 5 Concepts of Genetics	**Topic 5.1.** Law of segregation	**LW**
	Topic 5.2. Law of independent assortment	**LW**
	Topic 5.3. Sex-linked inheritance	**LW**
	Topic 5.4. Inheritance of linked genes	**LW**
	Topic 5.5. Genetic analysis. Gene mapping	**LW**
	Topic 5.6. Solving of genetic problems	**LW**
Module 6 Human Genetics	**Topic 6.1**. Human genome	**LC**
	Topic 6.2. Methods in Human Genetics	**LW**
	Topic 6.3. Cytogenetic method. Twin study	**LW**
	Topic 6.4. Population study	**LW**

Course module title	Course module contents (topics)	Academic activities types
	Topic 6.5. Pedigree analysis	**LW**
	Topic 6.6. Methods of Molecular Genetics	**LW**
	Topic 6.7. Human heredity. Human hereditary diseases	**LW**
	Topic 6.8. Non-Mendelian Inheritance. Non-Mendelian diseases	**LC**
	Topic 6.9. The principles of diagnosis, prevention and treatment of human hereditary diseases	**LW**
	Topic 6.10. Genetic engineering. Gene therapy	**LC**
Module 7 Medical Protozoology	**Topic 7.1.** Basic concepts of medical parasitology	**LC**
	Topic 7.2. Subkingdom Protozoa. Phylum Sarcomastigophora. Class Rhizopoda	**LW**
	Topic 7.3. Class Zoomastigophorea	**LW**
	Topic 7.4. Class Zoomastigophorea. Order Kinetoplastida	**LW**
	Topic 7.5. Phylum Apicomplexa, Class Sporozoa	**LW**
	Topic 7.6. Phylum Ciliophora, Class Ciliata	**LW**
Module 8 Medical Helminthology	**Topic 8.1.** Phylum Platyhelminthes. Class Trematoda	**LW**
	Topic 8.2. Class Trematoda	**LW**
	Topic 8.3 Class Cestoda, order Diphyllobothriidea	**LW**
	Topic 8.4. Class Cestoda, Taeniidae	**LW**
	Topic 8.5. Class Cestoda, Hymenolepis and Echinococcus	**LW**
	Topic 8.6. Phylum Nemathelminthes. Class Nematoda	**LW**
	Topic 8.7. Class Nematoda, geohelminths	**LW**
	Topic 8.8. Class Nematoda, biohelminths	**LW**
	Topic 8.9. Ovohelminthoscopy	**LW**
Module 9 Medical significance of arthropods	**Topic 9.1.** Phylum Arthropoda. Subphylum Branchiata, Class Crustacea. Subphylum Chelicerata, Class Arachnida	**LW**
	Topic 9.2. Subphylum Tracheata, Class Insecta, order Diptera	**LW**
	Topic 9.3. Subphylum Tracheata, Class Insecta, human parasites	**LW**
Module 10 Evolution of the organic world.	**Topic 10.1.** History of evolutionary ideas	**LC**
	Topic 10.2. The main points of the modern evolution theory	**LC**

Course module title	Course module contents (topics)	Academic activities types
Anthropogenesis	**Topic 10.3.** Anthropogenesis	**LC**
Module 11 Man and the Biosphere	**Topic 11.1.** Man and the Biosphere	**LC**

* - to be filled in only for **full** -time training: *LC - lectures; LW - lab work; S - seminars.*

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Lecture	A classroom for laboratory work, individual consultations, current and mid- term assessment; equipped with a set of specialised furniture, machinery, and technical means of multimedia presentations. (328, 329, 330, 331, 342, 343)	A set of specialized furniture; whiteboard; technical means of multimedia presentations. Microscopes. Software: Microsoft Windows, MS Office / Office 365, MS Teams.
Lab work	Laboratory of Molecular Genetics (332, 332A)	PCR laboratory equipment
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture (342)	A set of specialized furniture; whiteboard; technical means of multimedia presentations.

* The premises for students' self-studies are subject to **MANDATORY** mention

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. Essential medical biology. V. 1 : Cell biology / N. V. Chebyhev, I.A. Berechikidze, S.M. Kuzin [и др.] ; Ed. by N.V. Chebyshev. - Книга на английском языке. - Moscow : Medical Informational Agency, 2020. - 113 p.
2. Essential medical biology. V.2 : Genetics / N. V. Chebyhev, S.H. Larina, E.S. Gorozhanina [и др.] ; Ed. by N.V. Chebyshev. - Книга на английском языке. - Moscow : Medical Informational Agency, 2020. - 112 p.
3. Essential medical biology. V. 3 : Human parasitology / N. V. Chebyhev, I.A. Berechikidze, G.G. Grineva [и др.] ; Ed. by N.V. Chebyshev. - Книга на английском языке. - Moscow : Medical Informational Agency, 2020. - 264 p.

4. Myandina G.I. Medical parasitology. – M.: PFU. – 2014. https://lib.rudn.ru:443/MegaPro/UserEntry?Action=Link_FindDoc&id=444651&idb=0

Additional readings:

1. Общая генетика [Текст/электронный ресурс] = General Genetics. Manual for Graduate Students : Учебное пособие / Е.В. Романова, П. Кезимана. - Книга на английском языке; Электронные текстовые данные. - М. : Изд-во РУДН, 2018. - 104 с.
2. Fletcher H., Hickey I. Genetics. – Garland Science. – 2013.
3. Klug W.S., Cummings M.R., Spencer C.A., Palladio M.A. Concepts of genetics. – Pearson Education International. – 2014.
4. Lewin B. Genes. – Oxford University Press. – 2012.
5. Color Atlas of Genetics / Passarge Eberhard. - 4th edition, revised and update. - Stuttgard ; New York : Thieme, 2013.
6. Vogel and Motulsky's Human Genetics: Problems and Approaches / M. Speicher, Antonarakis S.E., Motulsky A.G. – Springer. – 2010.

Internet sources:

1. Electronic libraries with access for RUDN students:

- RUDN online library http://lib.rudn.ru/MegaPro/Web
- Scientific electronic library: - http://elibrary.ru
- Nature - http://www.nature.com/siteindex/index.html
- EL "University Library Online" http://www.biblioclub.ru
- http://www.biblio-online.ru
- EL "Student Consultant" www.studentlibrary.ru
- EL "Lan" http://e.lanbook.com/
- EL "Yurayt" http://www.biblio-online.ru

1. Databases and search engines:

- National Center for Biotechnology Information (NCBI) - www.ncbi.nlm.nih.gov
- ScienceDirect - http://www.sciencedirect.com
- Google Academy - http://scholar.google.ru/
- SCOPUS http://www.scopus.com/
- *Training toolkit for self- studies to master the course *:*
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- 1. The set of lectures on the course “Biology”
- 2. The laboratory workshop (if any) on the course “Biology”
- 3. The guidelines for writing a course paper / project (if any) on the course “Biology”.
- 4. ……
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- * The training toolkit for self- studies to master the course is placed on the course page in the university telecommunication training and information system under the set procedure.
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- **8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS’ COMPETENCES LEVEL UPON COURSE COMPLETION**
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- The assessment toolkit and the grading system* to evaluate the competences formation level (GPC-5) upon the course study completion are specified in the

Appendix to the course syllabus.

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– * The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPERS:

Associate professor, Department of Biology and General Genetics		O.B. Gigani
position, department	signature	name and surname
Head of the Department of Biology and General Genetics		M.M. Azova
position, department	signature	name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

Department of Biology **and General Genetics**		
name of department	signature	name and surname

HEAD OF HIGHER EDUCATION PROGRAMME:

Head of the Department of General Medical Practice		N.V. Sturov
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