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**Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
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

2022-2023

1. COURSE GOAL(s)

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

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) “Biology” is aimed at the development of the following competences /competences in part: General Professional Competences- (GPC)-2, (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-2	Being able to monitor the effectiveness of preventive measures, healthy lifestyle formation and sanitary and hygienic education of the population	GPC-2.3 Being able to prepare an oral presentation or a printed text which promote a healthy lifestyle and increase the population’s literacy concerning disease prevention issues
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-2	Being able to monitor the effectiveness of preventive measures, healthy lifestyle formation and sanitary and hygienic		Biochemistry, Hygiene

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
	education of the population		
GPC-5	Being able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional tasks		Biochemistry, Histology, Embryology, Cytology normal physiology Microbiology, Virology, Topographic Anatomy and Operative Surgery, Neurology, Medical Genetics, Neurosurgery, Forensic Medicine, Occupational Diseases, Hospital therapy

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course “Biology” 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/training modules		
		1	2	
<i>Contact academic hours</i>	170	85	85	
Including:				
Lectures (LC)	17	-	17	
Lab work (LW)	153	85	68	
Seminars (workshops/tutorials) (S)				
<i>Self-studies</i>	55	23	32	
<i>Evaluation and assessment (exam/passing/failing grade)</i>	27	-	27	
Course workload	academic hours	252	108	144
	credits	7	3	4

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 a 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 and 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. Forms 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, LW
	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 Diphylobothriidea	LW
	Topic 8.4. Class Cestoda, Taeniidae	LW
	Topic 8.5. Class Cestoda, Hymenolepis and Echinococcus	LW
	Topic 8.6. Phylum Nematelminthes. 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. Anthropogenesis	Topic 10.1. History of evolutionary ideas	LC
	Topic 10.2. The main points of the modern evolution theory	LC
	Topic 10.3. Anthropogenesis	LC

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

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 lecture hall for lecture-type classes, equipped with a set of specialised furniture; board (screen) and technical means of multimedia presentations.	
Lab work	A classroom for laboratory work, individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and machinery.	List of specialised laboratory equipment, machinery, stands, etc.
Seminar	A classroom for conducting seminars, group and individual consultations, current and mid-term assessment; equipped with a set of specialised furniture and technical means for multimedia presentations.	List of specialised equipment, stands, visual posters, etc.
Computer Lab	A classroom for conducting classes, group and individual consultations, current and mid-term assessment, equipped with personal computers (in the amount of ____ pcs), a board (screen) and technical means of multimedia presentations.	List of specialised software installed on computers for mastering the discipline
Self-studies	A classroom for independent work of students (can be used for seminars and consultations), equipped with a set of specialised furniture and computers with access to the electronic information and educational environment.	

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Main readings:

1. Klug W.S., Cummings M.R., Spencer C.A., Palladio M.A. Concepts of genetics. – Pearson Education International. – 2014.
2. Myandina G.I. Medical parasitology. – M.: PFU. – 2014.

Additional readings:

1. General Genetics [Text/electronic resource] = General Genetics. Manual for Graduate Students : Textbook / E.V. Romanova, P. Kezimana. - Book in English; Electronic text data. - M. : Publishing house of PFUR, 2018.- 104 c.
2. Fletcher H., Hickey I. Genetics. – Garland Science. – 2013.
3. Lewin B. Genes. – Oxford University Press. – 2012.
4. Color Atlas of Genetics / Passarge Eberhard. - 4th edition, revised and update. - Stuttgart ; New York : Thieme, 2013.
5. Vogel and Motulsky's Human Genetics: Problems and Approaches / M. Speicher, Antonarakis S.E., Motulsky A.G. – Springer. – 2010.
1. Gardner A., Davies T. Human Genetics. – Scion Publishing Ltd. – 2009.
6. Storry B., Wong E., Walker R.A., Gillaspay G., Sible J., Lederman M. – Working with Molecular Cell Biology (Fifth Edition). – W.H. Freeman and Company, New York. – 2004.
7. Gangane S.D. Human Genetics (Second edition). - Elsevier. Reed Elsevier India Private Limited. – 2004.
8. Heelan J.S., Ingersol F.W. Essentials of Human Parasitology. – Delmar. Thomson Learning. - 2002.

Internet sources:

1. Electronic libraries with access for RUDN students:

- RUDN online library <http://lib.rudn.ru/MegaPro/Web>
- Royal Society of Chemistry <http://pubs.rsc.org/>
- Scientific electronic library: - <http://elibrary.ru>
- Nature - <http://www.nature.com/siteindex/index.html>
- OxfordJournals - <https://academic.oup.com/journals/>
- <http://www.biblioclub.ru>
- <http://www.biblio-online.ru>
- www.studentlibrary.ru
- <http://e.lanbook.com/>

2. 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 *:*

1. The set of lectures on the course “Biology”

* 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.

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

The assessment toolkit and the grading system* to evaluate the competences formation level (GPC-2, GPC-5) upon the course study completion are specified in the Appendix to the course syllabus.

* 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:

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Department of Biology and
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O.B. Gigani

position, department

signature

name and surname

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**HEAD
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