Federal State Autonomous Educational Institution of 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

Molecular Genetics in Practical Biology and Medicine

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

2023-2024

1. COURSE GOAL(s)

The goal of the course "Molecular Genetics in Practical Biology and Medicine" is toequip students with knowledge in the field of practical application of the achievements of Molecular Genetics.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course (module) "Molecular Genetics in Practical Biology and Medicine" is aimed at the development of the following competences /competences in part: **General Professional Competences- (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		Biochemistry, Histology, Embryology, Cytology normal physiology Microbiology, Virology, Topographic Anatomy and Operative Surgery, Neurology, Medical Genetics, Neurosurgery, Forensic Medicine, Occupational Diseases,

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
			Hospital therapy

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course "Molecular Genetics in Practical Biology and Medicine" is 2 credits (72 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
Contact academic hours		***34***	***34***	
including:				
Lectures (LC)				
Lab work (LW)				
Seminars (workshops/tutorials) (S)		34	34	
Self-studies		*38*	*38*	
Evaluation and assessment (exam/passing/failing grade)				
Course workload	academic hours	**72**	**72**	
	credits	**2**	**2**	

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	Course module contents (topics)	Academic activities types
Module 1 Introduction into Molecular Genetics	**Topic 1.1.** History of Molecular Genetics. Important trends and advances in Molecular Genetics	**S**
Module 2 Transfer of genetic material in prokaryotes	**Topic 2.1.** Conjugation. Transformation. Transduction	**S**
Module 3 Polymerase chain reaction	**Topic 3.1.** Polymerase chain reaction. Types of PCR. Detection of amplified products	**S**
Module 4 Genetic engineering. Hybridization methods	**Topic 4.1.** Genetic engineering. Vectors. Restriction Enzyme Digest Analysis. Hybridization methods	**S**
Module 5 DNA sequencing	**Topic 5.1.** History of the method. DNA sequencing techniques and their application	**S**

Course module title	Course module contents (topics)	Academic activities types
Module 6 Molecular cytogenetic methods	**Topic 6.1**. Fluorescence in situ hybridization (FISH). Comparative genomic hybridization (CGH)	**S**
Module 7 Stem cells and genome reprogramming	**Topic 7.1.** Types of stem cells and their characteristics. Induced pluripotent stem cells. Nuclear reprogramming technologies	**S**
Module 8 Genome editing	**Topic 8.1.** Genome-editing technologies and their application	**S**
Module 9 Methods of epigenetic analysis	**Topic 9.1.** Introduction into Epigenetics. Factors influencing the epigenotype. Methods of epigenetic analysis	**S**

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	Lecture/Seminars/ Lab Classroom, equipped with a set of specialized furniture (328, 329, 330, 331, 342, 343)	A set of specialized furniture; whiteboard; a set of devices includes multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams, Chrome (latest stable release), Microscopes
Lab work	Laboratory of Biomolecular research (332, 332A)	PCR laboratory equipment
Self-studies	Self-studies classroom, equipped with a set of specialized furniture (342)	A set of specialized furniture; whiteboard; a set of devices includes multimedia projector, laptop, projection screen, stable wireless Internet connection. Software: Microsoft Windows, MS Office / Office 365, MS Teams,

Type of academic activities	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
		Chrome (latest stable release)

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.

Additional readings:

1. Fletcher H., Hickey I. Genetics. – Garland Science. – 2013.
2. Lewin B. Genes. – Oxford University Press. – 2012.
3. 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
- 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/

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 *:*

1. The set of lectures on the course “Molecular Genetics in Practical Biology and Medicine”

* 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-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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position, department	signature	name and surname
Head of the Department of Biology and General Genetics		M.M. Azova
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