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**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

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

1. COURSE GOAL(s)

The goal of the course is to equip students with the 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 course is aimed at the development of the following competences (competences in part): PC-2.

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

Competence code	Competence descriptor	Competence formation indicators (within this course)
PC-2	Being able to examine a patient in order to determine a diagnosis	PC-2.3 Being able to refer a patient to a laboratory examination in case there are medical indications in accordance with the current procedures for the provision of medical care, clinical guidelines (treatment protocols) on the provision of medical care taking into account the medical care standards

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

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

Within the higher education programme students also master other courses 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*
PC-2	Being able to examine a patient in order to determine a diagnosis	-	Microbiology, Virology Propaedeutics of Internal Diseases Immunology General Surgery Dermatovenerology Evidence-based Medicine Neurology, Medical Genetics, Neurosurgery Faculty Therapy Faculty Surgery Obstetrics and Gynecology

Competence code	Competence descriptor	Previous courses	Subsequent courses
			Otorhinolaryngology Ophthalmology Urology Professional Diseases Infectious Diseases Psychiatry, Medical Psychology Hospital Therapy Polyclinic Therapy Hospital Surgery, Pediatric Surgery Paediatrics Traumatology, Orthopedics Anesthesiology, Resuscitation, Intensive Care Oncology, Radiation Therapy Phthisiology Endocrinology Allergology Reproductive Health Endoscopic Urology Medical Enzymology

* 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 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	
			1	
<i>Contact academic hours</i>		34	34	
including:				
Lectures (LC)				
Lab work (LW)				
Seminars (workshops/tutorials) (S)		34	34	
<i>Self-studies</i>		38	38	
<i>Evaluation and assessment (exam/passing/failing grade)</i>				
Course workload	academic hours_	72	72	

Type of academic activities	Total academic hours	Semesters	
		1	
credits	2	2	

* 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 Introduction to 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
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 to Epigenetics. Factors influencing the epigenotype. Methods of epigenetic analysis	S

* - 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 classrooms	Classroom equipment	Specialised educational / laboratory equipment, software, and materials for course study (if necessary)
Specialized classroom	A classroom for conducting seminars, group and individual consultations, laboratory work, individual consultations, current and mid- term assessment; equipped with a set of specialised furniture, machinery, and technical means for multimedia presentations (328, 329, 330, 331, 342, 343)	A set of specialized furniture; whiteboard; technical means of multimedia presentations. 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.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.

Additional readings:

1. Fletcher H., Hickey I. Genetics. – Garland Science. – 2013.
2. Klug W.S., Cummings M.R., Spencer C.A., Palladio M.A. Concepts of genetics. – Pearson Education International. – 2014.
3. Lewin B. Genes. – Oxford University Press. – 2012.
4. 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 *:

1. The set of lectures on the course “Molecular Genetics in Practical Biology and Medicine”
2. The laboratory workshop (if any) on the course “Molecular Genetics in Practical Biology and Medicine”
3. The guidelines for writing a course paper / project (if any) on the course “Molecular Genetics in Practical Biology and Medicine”.
4.

* 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 (PC-2) 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:

Associate

professor,

Department of

Biology and

General Genetics

position, department

O.B. Gigani

signature

name and surname

Head of the

Department of

Biology and

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position, department

M.M. Azova

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name and surname

HEAD OF EDUCATIONAL DEPARTMENT:

Department of Biology and
General Genetics

M.M. Azova

name of department

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name and surname

**HEAD
OF HIGHER EDUCATION PROGRAMME:**

Head of the Department
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position, department

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name and surname