

RUDN University

Institute of Medicine

THE PROGRAM OF SCIENTIFIC RESEARCH PRACTICE

Direction: 06.06.01 «Biological sciences»

Profile: Genetics: molecular basis of human hereditary diseases

Qualification (degree) of a degree carrier: Researcher. Lecturer-researcher

1. The aim of the research practice

The aim of the research practices of post graduate student is to acquire practical skills of independent research.

2. Tasks of the research practice

Tasks of the research practice are:

- to master the methodology of scientific research work,
- to acquire practical skills in carrying out molecular genetic studies,
- to study modern information technology,
- to get skills in obtaining and analyzing scientific data.

3. The position of the research practice in the Principal educational program

The research practice is a component of professional training in higher education. It is a kind of a practical activity of students, which is necessary to conduct scientific research within the thesis.

The research practice is a part of the educational component stipulated in the Curriculum.

To be successful in the research a postgraduate student has to have a background in biology, primary skills in scientific inquiry, to be able to work with main information sources, to collect literature on the given subject, to prepare reviews on the research subject, to analyze ideas and conceptions, to have skills in the use of information technologies and data bases.

4. Forms of scientific research practice

The main form of the research practice is independent laboratory research.

5. The place and time of scientific research practice

The research practice is carried out in the Laboratory of biomolecular research at RUDN university, other institutions (in case of need), and libraries. The place of the practice depends on the topic of the PhD thesis.

The practice is performed during the 1st year of study.

6. The competencies which are formed due to the research practice

- **GPC-1.** the ability to carry out research in the professional field with the use of modern methods of research and information technologies;
- **PC-3.** the readiness for the independent analysis of available information, the goal setting, and problem solving;

- **PC-5.** the ability to use modern computer technology in the collection, storage, processing, analysis and transmission of biological information;
- **PC-6.** the ability to present and report the results of scientific research in accordance with rules;
- **PC-7.** the ability to apply the methodological principles of design and performance laboratory research using modern equipment;
- **PC-8.** the knowledge of normative documents regulating the organization and methodology of the research, the ability to ensure process safety.

7. The structure and content of the research practice

The labour intensity of the practice is **6 credits (216 hours)**.

№	Stages	Types of activity of postgraduate students and labour intensity (hours)		Evaluation instrument
1.	Preparatory stage	safety induction (2 hours)	drawing up individual study plans (2 hours)	Colloquium
2.	Main stage	Mastering methods of Molecular Genetics (120 hours)	Studying methods of statistical analysis (20 hours)	Colloquium Case study Analysis of control samples
3	Final stage	Report preparation (10 hours)	making a report (2 часа)	Analysis of the report; colloquium

8. The research, scientific, and production technologies used during the research practice

1. multimedia technologies
2. methods of molecular genetics (PCR, gel-electrophoresis, DNA extraction, restriction analysis)

9. The methodological support of student self-study work

Student self-study work is carried out in accordance with the individual task made up by a student and a supervisor and approved by the head of the department.

Postgraduate students use sources on the subject of their research. For this purpose they have to get acquainted with the studies recommended by supervisors and other scientists. Students have to be familiar with information on the topic of their research, published in international journals, available library systems and data bases, access to which is provided by the University.

The postgraduate student should know the rules of work in the Laboratory of Biomolecular Research, including safety rules.

Example questions for self-study control:

1. Extraction of nucleic acids.
2. The polymerase chain reaction and its application.
3. Types of the PCR. The real-time PCR.
4. DNA sequencing.
6. DNA restriction analysis.
7. Gel electrophoresis.

8. DNA staining.

10. The methodological and data support of the research practice

1. Electronic Library System of RUDN university
2. National Center for Biotechnology Information (NCBI) - www.ncbi.nlm.nih.gov
3. ScienceDirect - <http://www.sciencedirect.com>
4. Scientific electronic library: - <http://elibrary.ru>
5. Google Academy - <http://scholar.google.ru/>
6. Literature according to the topic of research

11. Equipment and material support of the practice:

- The Laboratory of Biomolecular Research
- Computers; Internet access
- Multimedia equipment

12. Types of control

Intermediate control

Studying of each unit is followed by an intermediate control of knowledge in the form of control questions to which students give oral answers, and genetic problems. During the intermediate control students have to show their knowledge and skills on the topic. The mark may be increased due to participation in the work of the department.

Final control

The final control is carried out in the form of oral interview. In addition, a student has to present a written report with results of the practice.

The report contains the information about an individual task, mastered techniques, a number of analyzed samples, a reference list.

Students who failed the practice have to repeat it, otherwise they will be expelled.

Rating scale

Rating Points	Marks	ECTS
95 – 100	5+	A
86 - 94	5	B
69 - 85	4	C
61 - 68	3+	D
51 - 60	3	E
31 - 50	2+	FX
0 - 30	2	F

13. Evaluation instruments

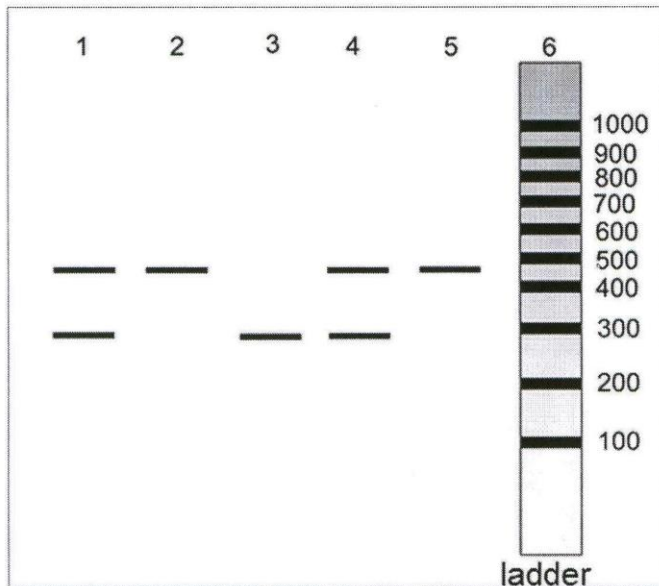
Control of acquired knowledge and skills is carried out in the form of oral colloquiums (*the example questions are presented in item 9*) and case study. An important part of the current control is the study of control samples issued by the scientific supervisor or the head of the department.

Types of tasks:

- to find the correct sequence of actions in the given technique;
- a description of the possible impact of various factors on the results of the research;
- to evaluate the result of the study.

Example case study:

The given disease is caused by a deletion. The gel-electrophoresis was performed after the PCR. Its results are shown in the picture. Determine genotypes of patients and the size of the deletion.



The competencies, stages when they are formed, and evaluation instruments

<i>Competencies</i>	<i>Stages</i>	<i>Evaluation instruments</i>
GPC-1	2, 3	Colloquium, case study, analysis of the final report
PC-3	2, 3	Colloquium, case study
PC-5, 6	2, 3	Colloquium, analysis of the final report
PC-7	2	Colloquium, case study, analysis of control samples
PC-8	1, 2	Colloquium

The program is designed in accordance with the RUDN educational standards of higher education.

Developer of the program

M.M. Azova

Director of the program

M.M. Azova