MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
"Far Eastern Federal University"
(FEFU)

SCHOOL Biomedicine

Abstracts
Work programs of academic disciplines

Direction of preparation
06/04/01 Biology

Academic Master's Program
Molecular and Cellular Biology

Qualification of the graduate - master

Full-time form of education
Standard term of development programs
(Full-time) 2 years

Vladivostok
2019

ANNOTATION
the working program of discipline
"English for Academic Purposes"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.B.01 'English for Academic Purposes "is written for students of educational master program 06.04.01" Molecular and Cell Biology ", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University" for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.B.01 'English for Academic Purposes "is included in the base of the compulsory subjects of the educational program of magistracy" Molecular and Cell Biology "areas of training 04.06.01 Biology.

The total complexity of the development of the discipline of 9 credits, 324 hours. Curriculum workshops (seminars) (144 hours), independent work of students (144 hours), control (36 hours). Discipline is implemented at 1 year 1 and 2 semesters.

The discipline of "English for Academic Purposes" logically and meaningfully related to such courses as "Methodology and methods of teaching natural sciences" and others.

Assessment of learning outcomes: Exam.

goal*:* formation of students' level of communicative competence, which provides the use of a foreign language for practical purposes in the framework of general and communicative and professionally-directed activity. The development of methods is formation and development of the ability and willingness to communicate orally and in writing in English to address the problems of professional activity.

Tasks:

1) Formation speaking another terminological apparatus undergraduates (academic and professional environment).
2) Development of skills of work with authentic professional-oriented texts.
3) Development of skills of speaking and writing in situations of intercultural professional communication.
4) Formation of undergraduates idea of communicative behavior in different

situations of communication;

5) Formation of students' system of concepts and realities of using a foreign language in professional activity.

6) Formation and development of tolerant ability to perceive social, ethnic and cultural differences.

As a result of studying this discipline at the following general cultural and general professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-7 the ability to free scientific and professional communication in a foreign language environment	He knows	– collection of modern requirements to the presentation of research results
	knows how	– model different formats of research, interpret the information on their own research
	owns	– strategies required for the adequate positioning of the professional level in the global research community
GC-1 the ability to creatively adapt the achievements of world science, technology and education to domestic practice, a high degree of professional mobility	He knows	– the basic concepts of project management
	knows how	– give the characteristics of the project
	owns	– the concept of project management.
GC-2 willingness to show leadership qualities and organize the work of the team, possess effective technology solutions professional problems	He knows	– the basic concepts of project management
	knows how	– give the characteristics of the project
	owns	– project management concept.
GC-3 ability to work in interdisciplinary project teams, including as head of	He knows	– standards in project management
	knows how	– examine the project management environment.
	owns	– organizational project management structure

OPK-1 willingness to communicate in oral and written form in the official language of the Russian Federation and foreign language to solve problems of professional activity	He knows	– the basic principles of project preparation, search, analyze and organize information, and teamwork
	knows how	– analyze and coordinate the activities of the staff; establish a constructive relationship in the team, work as a team towards a common goal
	owns	– ways of organizing team work; skills of independent work with the technology of effective communication

For the formation of the above competencies within the discipline of "English for Academic Purposes", the following methods of active / interactive learning: case-problems role-play, group discussions; round table, work in small groups.

ANNOTATION
the working program of discipline
"Bioinformatics"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.B.02 "Bioinformatics" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University," for implemented the basic professional educational programs towards the preparation 04.06.01 Biology, approved by order of the rector and Far Eastern Federal University of 04.04.2016 № 12-13-592.

Discipline B1.B.02 "Bioinformatics" is included in the base of the compulsory subjects of the educational program of magistracy "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides practical lessons (seminars) (36 hours), independent work of students (72 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Bioinformatics" logically and meaningfully related to such courses as "Biostatistics", "Mathematical modeling in biology."

Assessment of learning outcomes: credit.

Goal: students study the basic mathematical, statistical and algorithmic approaches and methods used in the field of computational molecular biology (bioinformatics).

Tasks:

1) obtaining representations of the current experimental techniques of molecular biology, data that is generated and tasks of processing the received biological information;

2) familiarity with methods for solving typical problems of bioinformatics, obtaining skills of practical use of commonly used bioinformatics techniques.

As a result of studying this discipline at the following general professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-4	He	–

the ability to quickly learn new subject areas, identify contradictions, problems and develop alternatives to address them	knows	
	knows how	–
	owns	–
GC-8 the ability to think abstractly, analysis, synthesis	He knows	–the advantages and disadvantages of functional, project and matrix structures.
	knows how	–work with project management software
	owns	–information management skills
GC-10 readiness for self-development, self-realization, the use of creative potential	He knows	–basic legislation
	knows how	–to overcome conflicts of interest
	owns	–Knowledge of the advantages and disadvantages of functional, project and matrix structures.
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the basic concepts of molecular biology
	knows how	–work independently with scientific and reference literature
	owns	–It has biological, biochemical medical terminology
OPK-7 willingness to creatively use modern computer technology in the collection, storage, processing, analysis and transmission of biological information for professional applications	He knows	–date databases of genomics and proteomics
	knows how	–use global bioinfomaticheskie RESOURCES
	owns	–methods of electrophoresis of proteins and nucleic acids
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of

		professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work

For the formation of the above competencies within the framework of "Bioinformatics" discipline, the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Biostatistics"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.B.03 "Biostatistics" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University," for implemented the basic professional educational preparation in the direction of biology 04.06.01 approved by order of the rector programs FEFU from 04.04.2016 number 12-13-592.

Discipline B1.B.03 "Biostatistics" is included in the base of the compulsory subjects of the educational program of magistracy "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (36 hours), independent work of students (54 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Biostatistics" logically and meaningfully related to such courses as "Bioinformatics", "Modeling and analysis of large data in biology."

Contents cover a range of issues related to the basic concepts of statistics and biological features of biological research; calculation methods generalising coefficients characterizing features of different aspects of the phenomenon; assessment of the reliability of the survey results; using parametric and non-parametric reliability evaluation methods results; evaluation techniques using multivariate statistics and the prediction; visualization of research results; priori analysis of statistical population in MS Excel environment and interpret the results.

A special feature in the design and content of the course is the use of active learning methods, software and hardware, fund teaching, evaluation and electronic means of discipline.

Assessment of learning outcomes: credit.

Goal: the formation of competence in theoretical knowledge, skills and experience of using statistical methods in the processing of biomedical research results, analysis of biological, environmental and other data collected at different stages of the research needed for future professional activity Master.

Tasks:

1) form a system of knowledge on the statistical processing of data in biology;

2) show opportunities using multivariate statistical techniques for data processing and analysis of biological data and experimental data;

3) to acquaint with the methods of systematization of experimental data and evidence-based biology in the interpretation of scientific facts.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC-2 willingness to manage a team in their professional activities, tolerant perceiving social, ethnic, religious and cultural differences	He knows	–principles of formation of the project team.
	knows how	–determine the composition of the team, introduce, educate distribution of roles.
	owns	–project management processes.
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–especially biological research
	knows how	–identify the problem; –perform formulation of the problem –conduct field and laboratory biological research for specific tasks; –use modern equipment and computer technology in biological experiments and research
	owns	–methods of assessing credibility and reliability of the results obtained
GPC-9 the ability to draw professionally, present and report the results of scientific research and production and engineering works on the approved forms	He knows	–certain results (goals, objectives, results, basic requirements, restrictive conditions, the criteria, the level of risk; the project environment, the potential participants, the required time, resources, tools, and others.);
	knows how	–collect raw data and analysis of the existing condition
	owns	–monitoring and management of processes: reporting on the execution of the project, the analysis of project progress, change management system project.

OPK-7 willingness to creatively use modern computer technology in the collection, storage, processing, analysis and transmission of biological information for professional applications	He knows	–stages of the statistical analysis
	knows how	–apply computer technology in the collection, storage, analysis and transmission of biological information
	owns	–methods of multivariate statistics biological information processing solutions for professional tasks
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–content of the basic regulations to ensure carrying out of research and production of biological and technological work.
	knows how	–to put into practice knowledge of the fundamentals of the organization and planning of research and production activities with regulations; –analyze and correlate the regional problems, to nationwide and worldwide; –manipulate data, various organizations, monitoring studies; –collect the necessary theoretical and practical material to perform the research work
	owns	–techniques of organizing and carrying out the research and production of biological and technological work. –independent analysis methods available biological information; –skills to work with library catalogs.

For the formation of the above competencies in the "Biostatistics" discipline used methods of active / interactive learning: a set of practical exercises and independent work, tests.

ANNOTATION
the working program of discipline
"Synergetics"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.B.04 "Synergetics" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

B1.B.04 discipline "Synergetics" is included in the base of the educational program of magistracy "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provided lectures (18 hours), practical studies (18 hours), independent work of students (72 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Synergetics" logically and meaningfully related to such courses as "Molecular biology", "Bioinformatics".

Assessment of learning outcomes: credit.

Goal:

Tasks:

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-5 the ability to generate ideas in the scientific and professional activities	He knows	–modern data management and cybernetics
	knows how	–develop a preliminary project.

	owns	–development project scope.
OPK-1 willingness to communicate in oral and written form in the official language of the Russian Federation and foreign language to solve problems of professional activity	He knows	–
	knows how	–
	owns	–
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the general laws of the origin and development of life; phylogeny and ontogeny of mammals and humans
	knows how	–use of educational, scientific, popular scientific literature, the Internet for professional activities
	owns	–principles of data collection, use of scientific literature and writing essays, multimedia presentations, based on the data of the report in the audience
GPC-6 ability to use the basic knowledge of theory of the biosphere, the understanding of modern biospheric processes for the systematic assessment of geopolitical events and the forecast impacts of socially significant projects	He knows	–
	knows how	–
	owns	–
GPC-8 the ability to use philosophical concepts of science for the formation of a scientific outlook	He knows	–
	knows how	–
	owns	–

For the formation of the above competencies within the framework of "Synergetics" discipline, the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Molecular biology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.B.05 "Molecular Biology" is made for students on the Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University" implemented for the basic professional educational programs towards the preparation 04.06.01 Biology, approved by Order rector of the Far Eastern Federal University of 04.04.2016 № 12-13-592.

Discipline B1.B.05 "Molecular Biology" is included in the base of the compulsory subjects of the educational program of magistracy "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (36 hours) and independent work of students (54 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Molecular Biology" logically and meaningfully related to such courses as "Molecular genetics, human genetics, human genetics", "Molecular Bioengineering".

Assessment of learning outcomes: credit.

Goal: training for basic medicine in the field of molecular biology with advanced theoretical knowledge and experimental training, the ability to formulate scientific and applied problems and propose approaches to address them.

Tasks:

1) to familiarize the students with the current state of molecular biology and the development trends in the XXI century;
2) generate at masters of the structure and function of nucleic acids and proteins; about the underlying molecular mechanisms of the cell;
3) generate ideas about the development of analytical and other research technologies used in modern molecular biology;
4) generate at masters the skills of research work;
5) generate at masters integrated approach to the development of theoretical and methodological study subjects; -

6) form a critical approach in the assessment of their own performance and their place in the global developments on this issue;

As a result of studying this discipline at the following general professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-6 the ability to conduct scientific debate, ownership norms of scientific style of modern Russian language	He knows	–particularly functional-style and genre differentiation of Russian literary language
	knows how	–use different language means in different situations of communication in oral and written form, demonstrating knowledge of language norms
	owns	–literacy skills and reasoned statement of the thoughts in oral and written communication in all situations
GC-9 willingness to act in unusual situations, bear the social and ethical responsibility for decisions	He knows	–basic legislation
	knows how	–to overcome conflicts of interest
	owns	–Knowledge of the advantages and disadvantages of functional, project and matrix structures.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional

		activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-2 ability to plan and implement professional activities (in accordance with the orientation (profile) master's program)	He knows	–certain results (goals, objectives, results, basic requirements, restrictive conditions, the criteria, the level of risk; the project environment, the potential participants, the required time, resources, tools, and others.);
	knows how	–collect raw data and analysis of the existing condition
	owns	–monitoring and management of processes: reporting on the execution of the project, the analysis of project progress, change management system project.

For the formation of the above competencies in the discipline "Molecular Biology", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Molecular Biology of the Cell"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.01 "Molecular Biology of the Cell" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University "implemented for the basic professional educational programs towards the preparation 06/04/01 Biology, Assertion Icaza FEFU rector of 04.04.2016 № 12-13-592.

Discipline B1.V.01 "Molecular Biology of the Cell" is included in the optional part of the educational program compulsory subjects Magistrates' Molecular and Cell Biology "areas of training 04.06.01 Biology.

The total complexity of the development of the discipline of 4 credit units, 144 hours. Curriculum provided lectures (18 hours), workshops (seminars) (18 hours), independent work of students (72 hours), the control (36 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Molecular Biology of the Cell" logically and meaningfully related to such courses as "Molecular genetics, human genetics, human genetics", "Molecular Bioengineering".

Assessment of learning outcomes: Exam.

Goal: training for basic medicine in the field of molecular biology with advanced theoretical knowledge and experimental training, the ability to formulate scientific and applied problems and propose approaches to address them.

Tasks:

1) to familiarize the students with the current state of molecular biology and the development trends in the XXI century;
2) generate at masters of the structure and function of nucleic acids and proteins; about the underlying molecular mechanisms of the cell;
3) generate ideas about the development of analytical and other research technologies used in modern molecular biology;
4) generate at masters the skills of research work;
5) generate at masters integrated approach to the development of theoretical and methodological study subjects;

6) form a critical approach in the assessment of their own performance and their place in the global developments on this issue;

As a result of studying this discipline at the following general professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-6 the ability to conduct scientific debate, ownership norms of scientific style of modern Russian language	He knows	–particularly functional-style and genre differentiation of Russian literary language
	knows how	–use different language means in different situations of communication in oral and written form, demonstrating knowledge of language norms
	owns	–literacy skills and reasoned statement of the thoughts in oral and written communication in all situations
GC-9 willingness to act in unusual situations, bear the social and ethical responsibility for decisions	He knows	–basic legislation
	knows how	–to overcome conflicts of interest
	owns	–Knowledge of the advantages and disadvantages of functional, project and matrix structures.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of

		professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-2 ability to plan and implement professional activities (in accordance with the orientation (profile) master's program)	He knows	–certain results (goals, objectives, results, basic requirements, restrictive conditions, the criteria, the level of risk; the project environment, the potential participants, the required time, resources, tools, and others.);
	knows how	–collect raw data and analysis of the existing condition
	owns	–monitoring and management of processes: reporting on the execution of the project, the analysis of project progress, change management system project.

For the formation of the above competencies in the discipline "Molecular Biology of the Cell", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Methodology and methods of teaching of natural sciences"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.02 "Methodology and methods of teaching natural sciences" is made for students on the Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education " Far Eastern federal University, "sold for the basic professional educational programs in the direction of Application 6.4.01 Biology, approved by order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

B1.V.02 discipline "Methodology and methods of teaching natural sciences" is included in the optional part of the educational program of magistracy "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides practical lessons (seminars) (18 hours), independent work of students (54 hours), control (36 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Methodology and methods of teaching natural sciences" logically and meaningfully related to such courses as "Commercialization of research and technology transfer" and others.

Assessment of learning outcomes: Exam.

Goal: FEFU produce graduates who know well enough his field of science, for teaching.

Tasks:

1) introduce students to the basic methods of conducting lessons (lectures, seminars, workshops) in schools and universities.
2) prepare for the difficult psychological and pedagogical situations.
3) provide an understanding of the teacher's work place in the practical and the spiritual life of mankind.

For the development of student discipline "Methods of teaching natural sciences' be familiar with natural science disciplines in undergraduate volume. In turn, this discipline is necessary for the preparation and defense of a thesis.

As a result of studying this discipline at the following professional competence (competency elements) are formed of students:

Code and the wording of competence	Stages of formation of competence	
GC-2 willingness to show leadership qualities and organize the work of the team, possess effective technology solutions professional problems	He knows	–the basic concepts of project management
	knows how	–give the characteristics of the project
	owns	–project management concept.
OPK-1 willingness to communicate in oral and written form in the official language of the Russian Federation and foreign language to solve problems of professional activity	He knows	–
	knows how	–
	owns	–
GPC-2 willingness to manage a team in their professional activities, tolerant perceiving social, ethnic, religious and cultural differences	He knows	–principles of formation of the project team.
	knows how	–determine the composition of the team, introduce, educate distribution of roles.
	owns	–project management processes.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-12 possession of skills formation of teaching material, lectures, willingness to teach in educational institutions, as well as in educational institutions of higher education and the management of research work of students, the ability to present course material in oral, written and graphic forms for various contingents of students	He knows	–basics of teaching methods in educational institutions, as well as in educational institutions of higher education,
	knows how	–present course material in oral, written and graphic forms for various contingents of students
	owns	–formation of skills of teaching material, lectures, teaching in educational institutions, as well as in educational institutions of higher education and management of research work of students, present course material in oral, written and graphic forms for various contingents of students
PC-13 willingness to use in teaching activities of knowledge about the history of marine biology in the Far East, Far Eastern scientists contribution to research and	He knows	–history of marine biology in the Far East, Far Eastern scientists contribute to research and development and scientific and industrial potential of the country
	knows how	–use in teaching activities of knowledge about the history of marine biology in the

scientific and industrial potential of the country		Far East, Far Eastern scientists contribution to research and scientific and industrial potential of the country
	owns	–skills to use in the teaching activities of knowledge about the history of marine biology in the Far East, Far Eastern scientists contribution to research and scientific and industrial potential of the country

For the formation of the above competencies in the discipline "Methodology and methods of teaching natural sciences", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, sketching micropreparations and graphical system analysis.

ANNOTATION
the working program of discipline
"Immunology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.03 "Immunology" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University," for implemented the basic professional educational programs towards the preparation 04.06.01 Biology, approved by order of the rector D FU on 04.04.2016 number 12-13-592.

Discipline B1.V.03 "Immunology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides lectures (9:00), practical exercises (seminars) (27 hours), independent work of students (27 hours), control (45 hours). Discipline is implemented on 2 course 3 semester.

Discipline "Immunology" logical and meaningful rates associated with such as "Molecular Biology," "Methods of molecular and cellular diagnostics".

Assessment of learning outcomes: Exam.

Goal: study of structural and functional organization of the immune system, recognition mechanisms, storage and elimination of genetically alien structures, methods of research of the immune status.

Tasks:

1) study system, organ, tissue, cellular and molecular levels reactions innate and adaptive immunity, specific forms of immune process;
2) familiarity with the recognition mechanisms, storage and elimination of genetically alien structures, methods of research of the immune status;
3) the ability to use knowledge of the fundamentals of immunology and allergy in the pedagogical process and scientific research.

For successful study of "Immunology" discipline among students following preliminary competences should be formed:

- the ability to use modern methods and technologies (including information) in their professional activities;
- the ability to self-organization and self-education;

– the ability to apply knowledge of the principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life;

– ability and willingness to understand and analyze the biochemical, physical, chemical, molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body.

As a result of studying this discipline at the following professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
PC-1, the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–applied and basic sections immunophysiology
	knows how	–He knows how to use this knowledge for applied and fundamental sections immunophysiology
	owns	–skills to use the acquired knowledge in immunophysiology
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the basic concepts of molecular biology
	knows how	–work independently with scientific and reference literature
	owns	–It has biological, biochemical medical terminology
PC-5 the ability to conduct research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and improve the competitiveness of Far	He knows	–the basic concepts of mathematical modeling
	knows how	–analyze the phase portrait of the dynamics of biological systems
	owns	–knowledge and literature on the mathematical modeling of biological systems in the Russian Far East

Eastern Federal University)		

For the formation of the above competencies within the framework of "Immunology" discipline used this method of active learning as a workshop discussion.

ANNOTATION
the working program of discipline
"Molecular genetics, human genetics"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.04 "Molecular genetics, human genetics" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University "implemented for the basic professional educational programs towards the preparation 06/04/01 Biology, Assertion Icaza FEFU rector of 04.04.2016 № 12-13-592.

Discipline B1.V.04 "Molecular genetics, human genetics" is included in the optional part of the educational program of magistracy "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (18 hours), independent work of students (27 hours), control (45 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Molecular genetics, human genetics" logically and meaningfully related to such courses as "Molecular Biology", "Molecular Bioengineering".

Assessment of learning outcomes: Exam.

goal: Teaching students the use of molecular genetic techniques in the diagnosis of disease and the molecular-genetic processes, to lay the foundations of genetic approaches in dealing with any medical problems.

Tasks:

1) development of theoretical bases of molecular genetics, the study of the principles of molecular genetic analysis;

2) familiarization with the methods and means of molecular genetic studies;

3) the development of solutions of molecular genetic problems.

4) understanding of the goals and possibilities of modern methods of cytogenetic, biochemical and molecular genetic diagnosis.

For successful study of discipline "Molecular genetics, human genetics" in students the following preliminary competences should be formed:

– willingness to practice the methods of the humanities, the natural sciences, life sciences in the educational activity;

– the ability and willingness to identify the essence of natural science problems, analyze the results of scientific, biomedical, improve their professional knowledge and skills;

– the ability and willingness to analyze the information using a systematic approach to the perception of innovation, the use of theoretical and methodological knowledge and skills in fundamental natural sciences, medical and biological disciplines in the classroom.

As a result of studying this discipline at the following professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
PC-1, the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–applied and basic sections immunophysiology
	knows how	–He knows how to use this knowledge for applied and fundamental sections immunophysiology
	owns	–skills to use the acquired knowledge in immunophysiology
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the basic concepts of molecular biology
	knows how	–work independently with scientific and reference literature
	owns	–It has biological, biochemical medical terminology
PC-5 the ability to conduct research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans	He knows	–the basic concepts of mathematical modeling
	knows how	–analyze the phase portrait of the dynamics of biological systems
	owns	–knowledge and literature on the mathematical modeling of biological systems in the Russian Far East

(in accordance with the program of development and improve the competitiveness of Far Eastern Federal University)		

For the formation of the above competencies in the discipline "Molecular genetics, human genetics", the following methods of active / interactive learning: lecture, press conference, discussion, debate.

ANNOTATION
the working program of discipline
"The commercialization of research and technology transfer"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.05 "Commercialization of research and technology transfer" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.05 "Commercialization of research and technology transfer" is included in the optional part of the educational program compulsory subjects Magistrates' Molecular and Cell Biology "areas of training 06/04/01 Biology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides lectures (9:00), practical exercises (seminars) (27 hours), independent work of students (72 hours). Discipline is implemented on 2 course 3 semester.

This discipline allows you to become familiar with this approach to the introduction of innovation, optimize performance, as the commercialization of research and technology transfer, to explore methods of project management, knowledge and project management processes.

Therefore, knowledge on the subject "The commercialization of research and technology transfer," are fundamental in the formation of a biologist, are the basis for the organization of the implementation of the knowledge acquired in the course of the subsequent development of theoretical subjects and formation of clinical thinking physician and biologist. "Management" and "information management" now part of cybernetics, computer science, so the study of ideas about how to manage a part of the fundamental science and medicine.

Discipline "Commercialization of research and transfer of technology" logically and meaningfully related to such courses as "Transfer of technology in biology" and others.

Assessment of learning outcomes: credit.

goal: To give students an idea of project management, to acquaint the participants with the structure, processes and project management features, critical

factors in the success of projects; familiarize yourself with the basic documents of the project management: project charter, project work breakdown structure, project organization, responsibility matrix, project schedule, project budget, communication management plan, plan to respond to risks and others.

Tasks:

1) the study of the conceptual apparatus of the discipline, basic theoretical assumptions and methods,

2) formation of skills and transfer of skills

3) application of theoretical knowledge to practical solutions and applications.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GC-3 ability to work in interdisciplinary project teams, including as head of	He knows	–standards in project management –
	knows how	–examine the project management environment.
	owns	–organizational project management structure
GC-5 the ability to generate ideas in the scientific and professional activities	He knows	–modern data management and cybernetics
	knows how	–develop a preliminary project.
	owns	–development project scope.
OPK-1 willingness to communicate in oral and written form in the official language of the Russian Federation and foreign language to solve problems of professional activity	He knows	–
	knows how	–
	owns	–
PC-2 ability to plan and implement professional activities (in accordance with the orientation (profile) master's program)	He knows	–certain results (goals, objectives, results, basic requirements, restrictive conditions, the criteria, the level of risk; the project environment, the potential participants, the required time, resources, tools, and others.);
	knows how	–collect raw data and analysis of the existing condition
	owns	–monitoring and management of processes: reporting on the execution of the project, the analysis of project progress, change management system project.

PC-4 the ability to generate new ideas and methodological solutions	He knows	–planning processes: the development of the project management plan, the main content of the project, structural planning.
	knows how	–use planning processes: cost estimates and the draft budget; the need for resources. The project schedule.
	owns	–Planning processes: quality planning, communication, risk management, scheduling and supply contracts.

For the formation of the above competencies in the discipline "Commercialization of research and technology transfer", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Modeling and analysis of large data in biology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.06 "Modeling and analysis of large data in biology" is written for students of Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.06 "Modeling and analysis of large data in biology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (9:00), practical exercises (seminars) (27 hours), independent work of students (72 hours). Discipline is implemented on 2 course 3 semester.

Discipline "Modeling and analysis of large data in biology" logically and meaningfully related to such courses as "Bioinformatics", "Biostatistics".

The course is designed for initial acquaintance masters with modern trends in research in biology, using mathematical modeling techniques and bioinformatics, as well as some classic examples of mathematical models of biological processes using the apparatus of nonlinear dynamical systems, which reflect the characteristics of the biological processes and demonstrating the effectiveness of the use of mathematical models for understanding mechanisms of functioning of biological systems. In

time studying the masters of discipline have to remember the basics of thermodynamics and entropy notion of morphological (biological) information, the differential calculus; learn the approaches to the construction of the phase portrait of behavior of biological systems; learn cybernetic approaches to assess adaptation, homeostasis, control systems.

Assessment of learning outcomes: credit.

Goal: give basic knowledge and understanding of the possibilities of practice of numerical methods of mathematical analysis, mathematical modeling, classification of mathematical models of biological objects.

Tasks:

1) generate ideas about the applicability of numerical methods of mathematical analysis in relation to the mathematical modeling of biological systems;

2) introduce specific mathematical models, research biologist who may apply (adapt) to their studies;

3) increase knowledge on the use of software tools for modeling biological processes.

As a result of studying this discipline at the following general professional and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
OPK-7 willingness to creatively use modern computer technology in the collection, storage, processing, analysis and transmission of biological information for professional applications	He knows	–Available software for numerical simulation of biological systems
	knows how	–give information assessment biosystems
	owns	–differential calculus
PC-3 the ability to apply the methodological principles of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–examples of mathematical models of biological
	knows how	–planning mathematical models.
	owns	–technology execution of field and laboratory biological and environmental research.
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the basic concepts of molecular biology
	knows how	–work independently with scientific and reference literature
	owns	–It has biological, biochemical medical terminology
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in	He knows	–PCR methods
	knows how	–work on the software of modern molecular biology
	owns	–Technology Molecular Diagnostics

solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results		

For the formation of the above competencies in the discipline "Modeling and analysis of large data in biology", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Molecular and cellular mechanisms of carcinogenesis"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.07 "Molecular and cellular mechanisms of carcinogenesis," composed for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far federal University "sold for basic vocational education by field of study 4.6.01 biol programs Gia, approved by order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.07 "Molecular and cellular mechanisms of carcinogenesis," is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 04.06.01 Biology.

The total complexity of the development of the discipline is 5 credits, 180 hours. Curriculum provided laboratory work (72 hours), independent work of students (72 hours), the control (36 hours). Discipline implemented on a course 1 and 2 in the 2 and 3 terms.

Discipline "Molecular and cellular mechanisms of carcinogenesis" logical and meaningful rates associated with such as "Methods of molecular and cellular diagnostics", "Molecular Biology".

Assessment of learning outcomes: Exam.

Goal: acquisition of knowledge about the molecular and cellular mechanisms of carcinogenesis, pathological and molecular features of malignant tumor cells, development of methods of identification and analysis of tumor cells.

Tasks:

1) Introduce masters the basic theories of carcinogenesis.

2) Disassemble the carcinogenesis mechanisms at the molecular and cellular levels.

3) Teach basic methods of morphological and molecular typing malignancies.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of	Stages of formation of competence

competence		
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern oncology problems; –theoretical foundations, achievements and problems of modern oncology; –on the current state and prospects of development of oncology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing problems of modern oncology.
	knows how	–apply general scientific cognitive principles of the organization and conduct of cancer research; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern oncology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of oncology;
PC-5 the ability to conduct research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and improve the competitiveness of Far Eastern Federal University)	He knows	–the basic concepts of mathematical modeling
	knows how	–analyze the phase portrait of the dynamics of biological systems
	owns	–knowledge and literature on the mathematical modeling of biological systems in the Russian Far East
GPC 3 willingness to use	He knows	–the general laws of the origin and development of life; phylogeny and ontogeny of mammals and humans

fundamental biological representation in the professional field for setting and meeting new challenges	knows how	–use of educational, scientific, popular scientific literature, the Internet for professional activities
	owns	–principles of data collection, use of scientific literature and writing essays, multimedia presentations, based on the data of the report in the audience

For the formation of the above competencies in the discipline "Molecular and cellular mechanisms of carcinogenesis", the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Biomedical cell technologies"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.01.01 "Biomedical cellular technology" is written for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.DV.01.01 "Biomedical cellular technology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline is 5 credits, 180 hours. Curriculum provides lectures (18 hours), laboratory work (18 hours) and independent work of students (99 hours), control (45 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Biomedical cell technology" logically and meaningfully related to such courses as "Molecular Bioengineering", "Reproduction and differentiation of cells."

Assessment of learning outcomes: Exam.

Goal: Form a competence in the field of modern biomedical cell technologies, to develop students' knowledge in the field of cell biology in the culture, learn the basic modern methods of manipulation of living cells and their use for the creation of cellular products, biotechnological systems based on them and new biomedical technologies.

Tasks:

1) A study of the theoretical bases of cell biology in the culture, to provide knowledge about the basic needs of the growth of cells in culture, their proliferation and differentiation.

2) Mastering basic cell culturing methods with cells under aseptic conditions, preparation of culture media and additives preparation of sterile materials and laboratory glassware, methods of preparation of primary cultures producing clones and maintain the viability of continuous cell lines,

cryopreservation techniques of cell cultures.

3) The development of the basic principles and methods of analysis of cultured cells, assessment of the viability, growth, proliferation and differentiation of cells in culture.

4) Mastering the basic skills of application of the cultured cells to create biotechnological production systems targeted biologically active substances and new biomedical technologies, including technologies based on the use of stem cells and biocompatible materials to create implantable tissue-engineering designs for the needs of regenerative medicine.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;

GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software;

and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)		–basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the discipline "Biomedical and cellular technologies", the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Comparative histology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.01.02 "Comparative histology" composed for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University," sold for basic professional education towards training programs 06/04/01 Biology, approved by order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

discipline B1.V.DV.01.02 "Comparative histology" is included in the optional part of the educational program of magistracy "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline is 5 credits, 180 hours. Curriculum provides lectures (18 hours), laboratory work (18 hours), independent work of students (99 hours), control (45 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Comparative histology" logically and meaningfully related to such courses as "Comparative histology", "Functional morphology."

Assessment of learning outcomes: Exam.

Goal: the study of the microscopic and submicroscopic structure and development of cells, tissues and organs; basic biological laws of development of organisms; study of the general laws for proper intervention in the development of the organism.

Tasks:

1) Learn basic research methods in histology.
2) Understand the biological laws of development, particularly prenatal and postnatal development of tissues and organs of the human body.
3) To study the microscopic and ultramicroscopic structure, functional features, tissues regenerator activity and organs of the human body.
4) Master the techniques of microscopy.
5) To teach the student the ability to identify the bodies, their tissues, cells and non-cellular structure with light and electron microscopy.
6) Explore the age, functional and adaptive changes of organs and their structural elements.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;

the quality of work and the scientific validity of the results	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–and methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies within the framework of "Comparative histology" discipline, the following methods of active / interactive

learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Medical and Pharmaceutical Biotechnology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.01.02 "Medical and Pharmaceutical biotechnology" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education " Far Eastern federal University, "sold for basic vocational education by field of study 6.4.01 Biol programs Gia, approved by order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.DV.01.02 "Medical and Pharmaceutical biotechnology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provided lectures (18 hours), laboratory (36 hours), independent work of students (54 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Medical and Pharmaceutical biotechnology" logically and meaningfully related to such courses as "Molecular Bioengineering", "Reproduction and differentiation of cells."

Assessment of learning outcomes: credit.

Goal: Form a competence in the field of modern medical and pharmaceutical biotechnology, to develop students' knowledge in the field of cell biology in the culture, learn the basic modern methods of manipulation of living cells and their use for the creation of cellular products, biotechnological systems based on them and new biomedical and pharmaceutical technologies.

Tasks:

5) A study of the theoretical bases of cell biology in the culture, to provide knowledge about the basic needs of the growth of cells in culture, their proliferation and differentiation.

6) Mastering basic cell culturing methods with cells under aseptic conditions, preparation of culture media and additives preparation of sterile materials and laboratory glassware, methods of preparation of primary cultures producing clones and maintain the viability of continuous cell lines,

cryopreservation techniques of cell cultures.

7) The development of the basic principles and methods of analysis of cultured cells, assessment of the viability, growth, proliferation and differentiation of cells in culture.

8) Mastering the basic skills of application of the cultured cells to create biotechnological production systems targeted biologically active substances and new biomedical technologies, including technologies based on the use of stem cells and biocompatible materials to create implantable tissue-engineering designs for the needs of regenerative medicine.

9) The development of methods for obtaining high-quality pharmaceutical products based on biotechnological techniques.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;

GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.

	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.
PC-4 the ability to generate new ideas and methodological solutions	He knows	–methodological solutions that contribute to the generation of new ideas.
	knows how	–generate new ideas and methodological solutions.
	owns	–skills to generate new ideas and solutions
PC-5 the ability to conduct research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and improve the competitiveness of Far Eastern Federal University)	He knows	–the basic concepts of mathematical modeling
	knows how	–analyze the phase portrait of the dynamics of biological systems
	owns	–knowledge and literature on the mathematical modeling of biological systems in the Russian Far East

For the formation of the above competencies in the discipline "Medical and Pharmaceutical biotechnology", the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Molecular bioengineering"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.02.02 "Molecular Bioengineering" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University "for the direction of implemented training 06/04/01 Biology major professional educational programs approved FEFU order of the rector of 04.04.2016 № 12-13-592.

Discipline B1.V.DV.02.02 "Molecular Bioengineering" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (18 hours), laboratory work (36 hours), independent work of students (54 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Molecular Bioengineering" logically and meaningfully related to such courses as "Molecular genetics, human genetics", "Molecular Biology".

During the development of the discipline of "Molecular Bioengineering", "studied engineering principles in working with biological systems, flora, fauna, microbes, achievements in the field of cell and genetic engineering, technical approaches to solve the health problems from the use of cellular technologies to create artificial organs, familiarity with new techniques preservation of natural resources, flora and fauna, and to acquire additional skills of knowledge of various sections of bioengineering in the professional de faculty.

Assessment of learning outcomes: credit.

Goal: to form modern concepts of basic principles, and bioengineering methods, experimental and practical implementation of artificial biological systems.

Tasks:

1) consider the current state and prospects of development of bioengineering;

2) learn the basic principles, methods of bioengineering and ethical issues and biosecurity issues associated with this area of research and practical application;

3) teach the skills of independent research and analysis, the use of it in the process of scientific and practical activities.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges	He knows	–the basic concepts of molecular bioengineering.
	knows how	–work independently with scientific and reference literature
	owns	–biological, biochemical medical terminology
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–use of biological agents to create bioengineered structures and systems
	knows how	–use enzymes to generate electrochemical energy converters.
	owns	–constructing cells by introducing various cell organelles.
OPK-7 willingness to creatively use modern computer technology in the collection, storage, processing, analysis and transmission of biological information for professional applications	He knows	–date databases of genomics and proteomics
	knows how	–use global bioinfomaticheskie RESOURCES
	owns	–methods of electrophoresis of proteins and nucleic acids
GPC-9 the ability to draw professionally, present and report the results of scientific research and production and engineering works on the approved forms	He knows	–certain results (goals, objectives, results, basic requirements, restrictive conditions, the criteria, the level of risk; the project environment, the potential participants, the required time, resources, tools, and others.);
	knows how	–collect raw data and analysis of the existing condition
	owns	–monitoring and management of processes: reporting on the execution of the project,

		the analysis of project progress, change management system project.
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 the ability to apply the methodological principles of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–examples of mathematical models of biological
	knows how	–planning mathematical models.
	owns	–technology execution of field and laboratory biological and environmental research.
PC-5 the ability to conduct research (according to the direction (profile) master's program) in the field of	He knows	–the basic concepts of mathematical modeling
	knows how	–analyze the phase portrait of the dynamics of biological systems

biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and improve the competitiveness of Far Eastern Federal University)	owns	–knowledge and literature on the mathematical modeling of biological systems in the Russian Far East

For the formation of the above competencies in the discipline "Molecular Bioengineering", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.

ANNOTATION
the working program of discipline
"Methods of molecular and cellular diagnostics"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.03.01 "Methods of molecular and cellular diagnostics" is made for students on the Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

B1.V.DV.03.01 Discipline "Methods of molecular and cellular diagnostics" included in the variable part educational master program "Molecular and Cellular Biology" direction preparation 06/04/01 Biology.

The total complexity of the development of the discipline of 4 credit units, 144 hours. Curriculum provided lectures (18 hours), laboratory (18 hours), independent work of students (72 hours), the control (36 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Methods of molecular and cellular diagnostics" logical and meaningful rates associated with such as "Molecular Biology," "Molecular genetics of human genetics."

Assessment of learning outcomes: Exam.

Goal: formation of students' systematic knowledge about modern methods of molecular and cellular diagnostics, mastering the basic methods of molecular and cellular diagnostics in medical and biological research.

Tasks:

1) To introduce Master to the current state of molecular and cellular diagnostics, its use in the clinic, promising developments in this area.

2) Explore the technology experiments, tests and analyzes in molecular and cellular diagnostics.

3) Teach masters work in the laboratory, the practical application of the basics of planning research.

For successful study of discipline "Methods of molecular and cellular diagnostics" in students the following preliminary competences should be formed:

– the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results (GPC-4);

– the ability to apply the methodological principles of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program) (PC-3);

– the ability to conduct scientific research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and competitiveness FEFU) (PK-5);

– willingness to use the knowledge of normative documents regulating the organization of the research and production of biological and technological works (according to the direction (profile) master's program) (PC-6);

As a result of studying this discipline at the following general professional and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;

	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with

		databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the discipline "Methods of molecular and cellular diagnostics", the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Reproduction and cell differentiation"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.03.02 "Reproduction and cell differentiation" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.DV.03.02 "Reproduction and cell differentiation" is included in the optional part of the educational program of magistracy "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 4 credit units, 144 hours. Curriculum provided lectures (18 hours), laboratory (18 hours), independent work of students (72 hours), the control (36 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Reproduction and cell differentiation" logically and meaningfully related to such courses as "Biomedical cell technology", "Molecular Biology".

Assessment of learning outcomes: Exam.

Goal: the acquisition of knowledge about reproduction and differentiation of cells, the study of mechanisms of their regulation, the development of the cell cycle assays, cell proliferation and differentiation.

Tasks:

1) A study of the theoretical foundations of cell reproduction, cell cycle, its stages and mechanisms of regulation.
2) Study of the molecular mechanisms of cell differentiation, principles of differential gene expression.
3) The study of cell cycle abnormalities.
4) The development of reproduction methods and assay of cell differentiation.

For successful study course "Biomedical and cellular technologies" among students following preliminary competences should be formed:

– the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results (GPC-4);

– the ability to apply the methodological principles of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program) (PC-3);

– the ability to conduct scientific research (according to the direction (profile) master's program) in the field of biology for the development of the scientific potential of the Russian Far East and the development of the resources of the oceans (in accordance with the program of development and competitiveness FEFU) (PK-5);

– willingness to use the knowledge of normative documents regulating the organization of the research and production of biological and technological works (according to the direction (profile) master's program) (PC-6)

As a result of studying this discipline at the following general professional and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;

	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with

		databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the discipline "Reproduction and cell differentiation", the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"Pathological histology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.04.01 "pathological histology" composed for students of educational master program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University "for the direction of implemented training 06/04/01 Biology major professional educational programs approved FEFU order of the rector of 04.04.2016 № 12-13-592.

Discipline B1.V.DV.04.01 "pathological histology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (18 hours), laboratory exercises (seminars) (18 hours), independent work of students (72 hours). Discipline is implemented on 1 course in 2 semesters.

Discipline "pathological histology" logically and meaningfully related to such courses as "Comparative histology", "Functional morphology."

Assessment of learning outcomes: credit.

Goal: formation of the masters of theoretical knowledge, practical skills in the basics of pathological histology, ability to independently formulate and solve scientific problems, as well as the problems of education in the field of medicine and public health.

Tasks:

1) morphological identification and characterization of etiologic factors that determine the occurrence and development of basic pathological processes based intravital morphological and postmortem studies using modern technical capabilities pathological anatomy;

2) vivo diagnosis and prognostic evaluation of tissue pathology based on biopsy materials research, scientific analysis of the pathological process underlying the disease;

3) study pathogenic mechanisms of disease as a whole and their manifestations (symptoms, syndromes), laying the foundations pathogenic therapy;

4) study of morphological and tanatogenesis diseases involvement of various organ and tissue systems by the formation of the main disease (poliorgannost pathology) and its end;

5) study the classification of diseases with their symptoms and syndromes, determines the specificity of etiological factors.

As a result of studying this discipline at the following professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training

solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results		using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological,	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.

environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the discipline of "pathological histology", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, sketching micropreparations and graphical system analysis.

ANNOTATION
the working program of discipline
"Pharmacology and Toxicology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.04.02 "Pharmacology and Toxicology" is written for students of educational master program 04.06.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education “Far Eastern Federal University” for the direction of implemented training 04.06.01 Biology major professional educational programs, approved by the order of the rector of the Far Eastern Federal University 04.04.2016 № 12-13-592.

Discipline B1.V.DV.04.02 "Pharmacology and Toxicology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provided lectures (18 hours), practical studies (18 hours), independent work of students (72 hours). Discipline is implemented on 1 course in the 2nd semester.

Discipline "Pharmacology and Toxicology" logically and meaningfully related to such courses as "Molecular biology", "Medical and Pharmaceutical biotechnology".

Assessment of learning outcomes: credit.

Goal:

Tasks:

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems

professional field for setting and meeting new challenges;		of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist

PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.
	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the "Pharmacology and Toxicology" discipline, the following methods of active / interactive learning:

- seminars in the form of "round tables";
- practical training in the form of "gaming".

ANNOTATION
the working program of discipline
"The development and pathology of the brain"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.05.01 "Development and pathology of the brain" is made for students on the Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education " Far Eastern federal University, "for the direction of implemented training 04.06.01 Biology major professional educational programs approved FEFU order of the rector of 04.04.2016 № 12-13-592.

Discipline B1.V.DV.05.01 "Development and pathology of the brain" is included in the optional part of the educational program of magistracy "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (9:00), practical exercises (seminars) (27 hours), independent work of students (72 hours). Discipline is implemented on 1 course in the 1 semester.

Discipline "Development and pathology of the brain" logically and meaningfully related to such courses as "Neurobiology".

Assessment of learning outcomes: credit.

Goal: Education about the laws of microscopic and ultramicroscopic structure of the nervous tissue and organs of the central and peripheral, their development and functioning, age-related features. This is necessary to further study the essence of the changes of tissue structures in diseases caused by exposure to various environmental factors external, internal and treatment.

Tasks:

1) the formation of the ability to apply knowledge of the cellular composition of clones and differons nervous system as the characteristics of the norm or signs of disease in the study of the following disciplines and in practical work.

2) the formation of practical skills in the histological diagnosis of nerve cells, tissues and organs, the ability to choose the appropriate methods for studying the tissues and organs and to interpret the results.

3) Learning to identify the bodies of structural units of the nervous system.

4) the generation of knowledge about morphofunctional equivalent function of organs, tissues and cells of the nervous system.

5) ability to conduct microscopic analysis of functional activity of organs and tissues of the nervous system.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC 3 willingness to use fundamental biological representation in the professional field for setting and meeting new challenges;	He knows	–basic concepts and methods of basic biology topics, essential for the development of modern biological problems; –theoretical foundations, achievements and problems of modern biology; –on the current state and prospects of development of cell biology, its place in the biological disciplines of the system; –the main trends of development of the educational system in addressing the problems of modern biology.
	knows how	–apply general scientific cognitive principles in organizing and conducting research in the field of biology; –use fundamental and applied knowledge in the sphere of professional activity; –use the latest information technology for formulating and solving problems of modern biology; –to identify the relationship of research and educational process in high school;
	owns	–ways of orientation in professional sources of information (magazines, websites, educational portals); –ways to solve new research problems; –skills necessary for the development of the theoretical foundations and methods of cell biology;
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in	He knows	–assays available information; –principles of mathematical models; –regulations governing the organization and methodology of the research and production of biological and technological works; –modern methods of research of biological objects.
	knows how	–pose the problem and perform laboratory biological research for specific tasks in the direction of training

solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results		using modern equipment and –computing means; –demonstrate responsibility for quality –works and scientific validity of the results;
	owns	–independent analysis methods available biological information; –skills to work with library catalogs.
GPC-2 willingness to manage a team in their professional activities, tolerant perceiving social, ethnic, religious and cultural differences	He knows	–principles of formation of the project team.
	knows how	–determine the composition of the team, introduce, educate distribution of roles.
	owns	–project management processes.
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows how	–to conduct an analysis of system objects; –adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	–methods of creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological,	He knows	–methodical bases of designing and executing laboratory biological research using modern hardware and instrument technology and computer systems with modern scientific software; –basic methods of biological research.

environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	knows how	–independently carry out biological research laboratory using modern hardware and instrument technology and computer systems subject to mandatory planning of future work with the assessment of the expected results; –to put into practice the methods of biological research.
	owns	–methods of planning and conducting biological research laboratory with modern equipment, and computer systems.

For the formation of the above competencies in the discipline "Development and pathology of the brain", the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, sketching micropreparations and graphical system analysis.

ANNOTATION
the working program of discipline
"Neurobiology"
the educational program
"Molecular and Cell Biology"
areas of training of Magistrates 06/04/01 Biology

The working program of discipline B1.V.DV.05.02 "Neurobiology" is made for students on the Master's educational program 06.04.01 "Molecular and Cell Biology", in accordance with the requirements of the educational standard, independently established by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University "implemented for the basic professional educational programs towards the preparation 06/04/01 Biology, approved by order of the river FEFU torus on 04.04.2016 number 12-13-592.

B1.V.DV.05.02 Discipline "Neurobiology" is included in the optional part of the educational master program "Molecular and Cell Biology" areas of training 06/04/01 Biology.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum provides lectures (9 hours), laboratory exercises (27 hours), independent work of students (72 hours). Discipline is implemented on 2 course 3 semester.

Discipline "Neurobiology" logically and meaningfully related to such courses as "Ravzitie and pathology of the brain", "Molecular Biology".

Assessment of learning outcomes: credit.

Goal:the formation of ideas about the functional organization of the nervous system, neural reflex mechanisms of organization behavior and the principles of the systemic organization of brain functions; about bases physiology of the nervous tissue and the central nervous system; Principles of system organization of brain functions; physiological mechanisms of receiving and processingInformation living organism; Physiology of human sensory systems, ensuring adequate interaction of the organism as a whole with the environment.

Tasks:

1) to present as fully as possible the most significant achievements of world and national neuroscience as a science that studies the device functioning, development, genetics, biochemistry, physiology and pathology of the nervous system;

2) to develop students' knowledge and skills development of analytical and critical works of outstanding researchers of the nervous system;

3) show that the structure of the human brain functions include different levels of study, from the molecular to the cellular (individual neurons), from a relatively small association neurons to large systems such as cerebral cortex and cerebellum, and the highest level - the nervous system whole;

4) promote the expansion of scientific horizons and improve the culture of psychological thinking of students.

As a result of studying this discipline at the following general culture, general and professional competence (competency elements) are formed of students:

Code and the wording of competence	**Stages of formation of competence**	
GPC-2 willingness to manage a team in their professional activities, tolerant perceiving social, ethnic, religious and cultural differences	He knows	–principles of formation of the project team.
	knows how	–determine the composition of the team, introduce, educate distribution of roles.
	owns	–project management processes.
GPC-4 the ability to independently analyze the available information to identify the fundamental problems, and set the task to carry out field and laboratory biological research in solving specific problems with the use of modern equipment and computing resources, responsible for the quality of work and the scientific validity of the results	He knows	–PCR methods
	knows how	–work on the software of modern molecular biology
	owns	–Technology Molecular Diagnostics
GPC-5 the ability to apply knowledge of the history and methodology of biological sciences to address the fundamental problems of professional	He knows	–the history of molecular biology
	knows how	–organize experiment
	owns	–professional knowledge of the molecular biologist
PC-1 the ability to creatively use in scientific and technological activities of production and knowledge of basic and applied sciences sections (modules), determines the direction (profile) master's program	He knows	–basic concepts, categories, modern techniques and technologies of organization and implementation of the educational process in high school; –the main provisions of laws, methods and achievements of the natural sciences; –the main trends of Cell Biology and Histology, approaches to the solution of biological problems
	knows	–to conduct an analysis of system objects;

	how	–adapt the modern achievements of science to the educational process; –use the principles of experimental methods; –identify natural science nature of the problems arising in the course of professional activity
	owns	––way creating and methods of work with databases; –basic methods, procedures, quality control technology education; –basic techniques, methods and means of obtaining, processing of information in the life sciences; –theoretical thinking skills: analysis, interpretation, classification, interpretation, compilation of facts; –system analysis method (systematic principle). –skills of independent research work
PC-3 ability to apply a methodical bases of designing, performing field and laboratory biological, environmental studies, use modern equipment and computer systems (in accordance with the orientation (profile) master's program)	He knows	–planning processes: the development of the project management plan, the main content of the project, structural planning.
	knows how	–use planning processes: cost estimates and the draft budget; the need for resources. The project schedule.
	owns	–Planning processes: quality planning, communication, risk management, scheduling and supply contracts.

For the formation of the above competencies in the "Neurobiology" discipline, the following methods of active / interactive learning: lecture, discussion, round table, brainstorming, and graphical system analysis.