



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

SCHOOL of Biomedicine

Course syllabuses

**Bachelor undergraduate program
19.03.01 Biotechnology**

**Educational program
Molecular biotechnology**

Qualification of the graduate - Academic Bachelor

Full-time form of education
Standard term of development programs
(Full-time education) for 4 years

Vladivostok
2019

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Course syllabus
"Foreign language"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B1.01.01 "Foreign Language" is written for "The Far Eastern Federal University" professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational in undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline of 16 credits, 576 hours. Curriculum provides practical training (288 hours.), An independent student work (144 h.), Additional contact work in the form of independent work of student control (108 hours). Subject implemented on the 1, 2 in the course 1,2,3,4 semester.

Subject included in the base part of the block "Subjects (modules)".

Subject "Foreign language" logically and meaningfully related to such courses as "History", "Philosophy", "Computer", and others.

Contents cover is traditionally generated reference direction in the study of a foreign language "Foreign language for general purpose".

a view to the development of the discipline is to develop skills of self-knowledge of a foreign language in order to achieve effective communication in situations of real communication.

Tasks:

1) raising spoken English with the average level (A2) to advanced level (B1) according the Common European Framework of Reference for Languages (CEFR)(A, B, C);

2) improving the skills of understanding speech in a foreign language at the hearing;

3) extension of active vocabulary, phraseology its enrichment;

4) mastery of speech etiquette of everyday communication;

5) expanding the horizons of the culture of the language being studied.

For successful study "Foreign language" discipline among students following preliminary foreign language communicative competence should be formed:

– speech competence - the development of communication skills in the four basic types of activities (speaking, listening, reading, writing);

– language competence - mastery of the new language features (phonetic, spelling, vocabulary, grammar) in accordance with the topics, areas and situations of communication selected for general school; the development of knowledge about the linguistic phenomena of the studied language, different ways of expression in the mother tongue and the target language;

– sociocultural competence - familiarizing students to the culture, traditions and realities of the country / countries to learn a foreign language within those areas and situations of communication, meeting experience, interests and psychological characteristics of students at different schools its stages; formation of skills to represent their country, its culture in a foreign language of intercultural communication;

– compensatory competencies - the development of skills out of the situation in the shortage of linguistic resources in the production and transmission of information;

– educational and cognitive competence - further development of general and specific skills training; familiarize students with the available means and methods of self-study language and culture, including the use of new information technologies;

– development and education of students' understanding of the importance of learning a foreign language in today's world and the need to use it as a means of communication, knowledge, self-realization and adaptation;

– the development of national consciousness, the desire for mutual understanding between people of different communities, tolerant attitude towards manifestations another culture.

Code and the wording of competence	Stages of formation of competence	
GCC-1 - the ability to self-improve and self-develop in the professional sphere for raising the general cultural level	Know	–general scientific terms in the amount sufficient to work with the original scientific texts and texts of a professional nature
	able to	–lexical correctly and competently, logically and consistently produce oral and written statements in situations of intercultural professional communication; –improved and developed in the professional field, to raise the general cultural level

	own	<ul style="list-style-type: none"> –culture of thinking; the ability to perceive, analyze, summarize information, setting goals and selecting ways of achieving them; –skills to improve their professional skills, self-development, self-education, raising the cultural level; –methods of self-improvement and self-development in the professional sphere, raising the general cultural level
GCC -2 – willingness to integrate into the scientific, educational, economic, political and cultural space of Russia and the APR	Know	–stages of the historical process (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign historical science, discussion problems of history
	able to	<ul style="list-style-type: none"> –put a scientific problem, to justify its relevance; –working with historical sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	<ul style="list-style-type: none"> –culture of thinking, the ability to synthesize, analyze, perception of information; –readily integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region
GCC -7 - mastery of a foreign language in oral and written form to implement intercultural and foreign communication	Know	<ul style="list-style-type: none"> –basic values studied lexical items (words, phrases, phraseology units idiomatic expressions) –the main ways of word formation; –grammatical rules and models, allowing to understand fairly complex texts in a foreign language and competently build its own language (oral and written) in various forms and in various modalities; –basic norms of speech etiquette (the most common evaluation vocabulary), adopted in the country of the target language; lifestyle characteristics, life and culture of the target language countries, the similarities and differences in the traditions of his country and the countries of the target language
	able to	–deal with most situations likely to arise whilst traveling in an area where the language without

		<p>training; into conversation on a familiar topic or causing interest (dialogue);</p> <ul style="list-style-type: none"> –build simple coherent statements about their personal experiences and events; –justify and explain his views and intentions; to tell a story or explain the plot of a book or film and express their attitude to this (monologue); –understand the main points clearly spoken statements within the literary norm on familiar topics that have to be dealt with in the educational, professional and everyday life; to understand what is involved in the majority of radio and TV programs on current events, as well as programs related to personal or professional interests (listening); understand texts, constructed on the frequency linguistic material everyday and professional communication; understand the description of events, feelings and wishes in personal letters (reading); –write simple coherent texts on familiar topics of interest; to write letters
		personal, informing them about their personal experiences and impressions
	own	<ul style="list-style-type: none"> –sufficient language skills (phonetics, spelling, vocabulary and grammar) in order to take –part in the conversation (to start, maintain and end a call) with a number of pauses and descriptive terms for familiar (learned) Situations
PC-8 - the ability to work with scientific and technical information, the implementation of Russian and international experience in professional activities	Know	<ul style="list-style-type: none"> –principles and characteristics of the organization and the accumulation of scientific information in English; –mechanisms and means, using the English language, required for professional applications in the field of production, storage and processing of information
	can	<ul style="list-style-type: none"> –extract scientific information from relevant sources in the English language; –work with scientific and technical information, to use the Russian and international experience in professional work, to use the language competence for achieving professional understanding
	own	–skills of independent work with educational and scientific literature on the subject of studies in English;

		–ability to work with the international scientific and technical information, to use the Russian and international experience in professional activities using the language competence for achieving professional understanding
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For the formation of the above competencies in the discipline "Foreign Language", the following methods of active / interactive learning: working in pairs (pair-share); Round Table (Round Table); Analysis method specific examples (Case-Study method).

Course syllabus
"English for professional purposes
(English for Specific Purposes)"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B1.01.02 "English for professional purposes (English for Specific Purposes)» is made for professional educational program on a profile "Molecular Biotechnology" 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 19.03.01 biotechnological programs logy, the level of higher education bachelor.

The total complexity of the development of the discipline of 8 credits, 288 hours. Curriculum provides practical training (144 hours.), An independent student work (108 h.), Additional contact work in the form of control of independent work student (36 hours). Subject implemented on the 1, 2 in the course of 1,2,3, 4 semester.

The discipline of "English for professional purposes (English for Specific Purposes)» logically and meaningfully related to such courses as "History", "Philosophy", "Informatics", "Russian language and culture of speech (Business Communication)" and others.

a view to the development of the discipline is to develop skills of self-knowledge of a foreign language in order to achieve effective communication in real situations of professional communication.

Tasks:

- 1) raising spoken English with the average level (A2) to advanced level (B1) according the Common European Framework of Reference for Languages (CEFR)(A, B, C);
- 2) improving the skills of understanding speech in a foreign language at the hearing;
- 3) extension of active vocabulary, phraseology its enrichment;
- 4) mastery of speech etiquette of everyday communication;
- 5) expanding the horizons of the culture of the language being studied.

For successful study "Foreign language" discipline among students following preliminary foreign language communicative competence should be formed:

- speech competence - the development of communication skills in the four basic types of activities (speaking, listening, reading, writing);
- language competence - mastery of the new language features (phonetic, spelling, vocabulary, grammar) in accordance with the topics, areas and situations of communication selected for general school; the development of knowledge about the linguistic phenomena of the studied language, different ways of expression in the mother tongue and the target language;
- sociocultural competence - familiarizing students to the culture, traditions and realities of the country / countries to learn a foreign language within those areas and situations of communication, meeting experience, interests and psychological characteristics of students at different schools its stages; formation of skills to represent their country, its culture in a foreign language of intercultural communication;
- compensatory competencies - the development of skills out of the situation in the shortage of linguistic resources in the production and transmission of information;
- educational and cognitive competence - further development of general and specific skills training; familiarize students with the available means and methods of self-study language and culture, including the use of new information technologies;
- development and education of students' understanding of the importance of learning a foreign language in today's world and the need to use it as a means of communication, knowledge, self-realization and adaptation;
- the development of national consciousness, the desire for mutual understanding between people of different communities, tolerant attitude towards manifestations another culture.

Code and the wording of competence	Stages of formation of competence	
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to present it in a required form using information, computer and network technologies	Know	–general scientific terms in the amount sufficient to work with the original scientific texts and texts of a professional nature
	able to	–lexical correctly and competently, logically and consistently produce oral and written statements in situations of intercultural professional communication; –improved and developed in the professional field, to

		raise the general cultural level
	own	<ul style="list-style-type: none"> –skills and podgotovlennoy nepodgotovlennoy ustnoy and pismennoy speech in situations of intercultural professional communication within the study of linguistic material; –culture of thinking; the ability to perceive, analyze, summarize information, setting goals and selecting ways of achieving them; –skills to improve their professional skills, self-development, self-education, raising the cultural level; –methods of self-improvement and self-development in the professional sphere, raising the general cultural level
GPC -2 the ability and willingness to use the basic laws of natural science disciplines in professional activities, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–stages of the historical process (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign historical science, discussion problems of history
	able to	<ul style="list-style-type: none"> –put a scientific problem, to justify its relevance; –working with historical sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	–culture of thinking, the ability to synthesize, analyze, perception of information;
		–readily integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region

GPC -7 - the ability to find and evaluate new technological solutions, implement the results of biotechnological research and development	Know	<ul style="list-style-type: none"> -basic values studied lexical items (words, phrases, phraseology units, idiomatic expressions); -the main ways of word formation; -grammatical rules and models, allowing to understand fairly complex texts in a foreign language and competently build its own language (oral and written) in various forms and in various modalities; -basic norms of speech etiquette (the most common evaluation vocabulary), adopted in the country of the target language; lifestyle characteristics, life and culture of the target language countries, the similarities and differences in the traditions of his country and the countries of the target language
	able to	<ul style="list-style-type: none"> -deal with most situations likely to arise whilst traveling in an area where the language without training; into conversation on a familiar topic or causing interest (dialogue); -build simple coherent statements about their personal experiences and events; -justify and explain his views and intentions; to tell a story or explain the plot of a book or film and express their attitude to this (monologue); -understand the main points clearly spoken statements within the literary norm on familiar topics that have to be dealt with in the educational, professional and everyday life; to understand what is involved in the majority of radio and TV programs on current events, as well as programs related to personal or professional interests (listening); understand texts, constructed on the frequency linguistic material
		<p>everyday and professional communication; understand the description of events, feelings and wishes in personal letters (reading);</p> <p>write simple coherent texts on familiar topics of interest; write personal letters, informing them about their personal experiences and impressions.</p>

	own	–sufficient language skills (phonetics, spelling, vocabulary and grammar) in order to take part in the conversation (to start, maintain and end a call) with a number of pauses and descriptive terms for familiar (learned) Situations
PC-8 - the ability to work with scientific and technical information, the implementation of Russian and international experience in professional activities	Know	–principles and characteristics of the organization and the accumulation of scientific information in English; –mechanisms and means, using the English language, required for professional applications in the field of production, storage and processing of information
	Able to	–extract scientific information from relevant sources in the English language; –work with scientific and technical information, to use the Russian and international experience in professional work, to use the language competence for achieving professional understanding
	own	–skills of independent work with educational and scientific literature on the subject of studies in English; –ability to work with the international scientific and technical information, to use the Russian and international experience in professional activities using the language competence for achieving professional understanding

For the formation of the above competencies within the discipline of «English for professional purposes (English for Specific Purposes)», the following methods of active / interactive learning: working in pairs (pair-share); Round Table (Round Table); Analysis method specific examples (Case-Study method).

Course syllabus
«Physical education and sports»
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.02.01 «Physical education and sports»" is written for professional educational program on a profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology, in accordance with the requirements of the educational standard of higher education, self-installed FEFU.

Subject "Physical training and sports" is optional and included in the base part of the block "Subjects (modules)" curriculum.

The total complexity of the development of the discipline is 2 credit units, 72 academic hours. Curriculum provides lecture (2 hours) and practical classes (68 hours) and independent work of students (2 hours). Subject is implemented on I course in 1 semester.

Academic discipline "Physical education and Sports" series related to the following disciplines «Health and safety».

The main content of discipline "Physical Culture Life "is the general theoretical aspects of physical culture, the practical application of funds (exercises) of the basic types of motor activity (athletics, sports games (volleyball)) for the formation of physical culture of the person.

a view to of the discipline is to develop physical culture of the individual and the ability to use a variety of directional means of physical culture and sport for the preservation and strengthening of health, psycho-physical training and self-study for future professional activities.

Tasks:

1) building knowledge and skills in the implementation of funds basic types of motor activity (athletics, sports games (volleyball)) aesthetic and spiritual development of students;

2) development of physical abilities with basic types of motor activity to promote health and maintain physical and mental performance;

3) education of socially significant qualities and shaping the needs of a healthy lifestyle for effective professional self-realization.

For successful study of discipline «Physical education and sports»" students following preliminary competences should be formed:

– ability to use basic forms and types of sports activities for the organization of healthy lifestyles, recreation and leisure;

– possession of the common methods of strengthening and preserving health, maintaining health, preventing disease prevention.

As a result of studying the discipline the students formed following general cultural competence:

Code and the wording of competence	Stages of formation of competence	
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to present it in a required form using information, computer and network technologies	Know	–methods of self-improvement and self-development in the professional field, to improve the cultural level
	able to	–cultivate and develop in a professional field, to improve the cultural level
	own	–methods of self-improvement and self-development in the professional field, to improve the cultural level
GCC -13 - the ability to work in a team, tolerantly perceiving social and cultural differences	Know	–principles of operation of a professional team, to understand the role of corporate norms and standards
	able to	–work in a team, effectively carry out tasks of professional activity
	own	–methods of interaction with the staff, to perform various professional tasks and duties
GCC -14 - the ability for self-organization and self-education	Know	–ways of obtaining information
	able to	–receive and process information
	own	–methods of preparation, processing and transmitting information
GCC -15 - the ability to use methods and means of physical culture to ensure full-fledged social and professional	Know	–general theoretical aspects of physical education, their role and importance in the formation of a healthy lifestyle; –principles and methods of organization, judging of fitness and sports events

activity	able to	<ul style="list-style-type: none"> –self-build individual trajectory of sport and athletic achievement; –use a variety of means and methods of physical training to maintain and strengthen health, improve efficiency; –to use self-control methods of the physical condition; –work as a team to achieve common goals and personal
	own	<ul style="list-style-type: none"> –various forms and kinds of sports activities for the organization of a healthy lifestyle; –methods of self-control of individual health indicators of physical fitness; –basic motor actions sports and actively apply them in the game, and competitive activity; –system of professional and life important practical skills, ensuring the preservation and strengthening of physical and mental health

Course syllabus
"PHILOSOPHY"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.03.01 "Philosophy" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology Approved by order of the rector of 22.03.2017 № 12-13-485.

The total complexity of the development of the discipline is 3 credits, 72 hours. Curriculum provided lectures (36 hours, including using MAO 10 hours), practical studies (18 hours, including the use of MAO 8 hours, and electronically 2 hours), independent student's work (54 hours). Subject includes a base portion 2 and is implemented in the course of 3 semester.

Subject "Philosophy" contributes to students' holistic system representation of the world and place it in person; stimulate demand for philosophical assessments of historical events and facts of reality; expand erudition of the future experts and enrich their spiritual world; to help the formation of personal responsibility and self-reliance; develop an interest in the fundamental knowledge.

Subject "Philosophy" is logically and meaningfully related to such courses as "Jurisprudence", "History", "Russian language and culture of speech."

Goals development of the discipline "Philosophy" is to develop the scientific and philosophical outlook of students based on their mastery of knowledge in the field of the history of philosophy and the study of the basic problems of philosophy; the development of philosophical thinking - the ability to think independently, possess modern methods of analysis of scientific facts and phenomena of social life, to be able to draw conclusions and generalizations.

Tasks:

1) master the culture of thinking ability in writing and speaking correctly and clearly make out the results of intellectual activity;

2) to strive for self-development, improve their qualifications and skills;

3) the ability to form scientifically analyze socially significant problems and processes, the ability to use the basic terms and methods of humanitarian, social and economic sciences in a variety of professional and social activities;

4) acquire new knowledge, using modern educational and information technologies;

5) develop the ability to use knowledge and understanding of human problems in the modern world, values of the world and Russian culture, the development of intercultural dialogue skills;

6) cultivate tolerance of racial, national, religious differences of people.

To successfully study the "philosophy" of discipline among students following preliminary competences should be formed:

- the ability to express ideas orally and in writing in accordance with the grammatical, semantic and cultural norms of the Russian language.

- possession of the basic thesaurus social sciences.

As a result of studying the discipline the following general cultural competence (competency elements) are formed by the students:

Code and the wording of competence	Stages of formation of competence	
GCC-1 - the ability to self-improve and self-develop in the professional sphere for raising the general cultural level	Know	–the history of the main areas of human thought
	able to	–have the skills to participate in scientific discussions, make presentations and lectures, oral, written and virtual (hosted in information networks) submission own research
	own	–culture of thinking; the ability to perceive, analyze, summarize information, setting goals and choosing the ways of achieving them
GCC -6 - the ability to understand, use, generate and correctly express innovative ideas in Russian language in reasoning, publications, public discussions	Know	–the basic norms of the modern Russian language and the system of functional styles of Russian language
	able to	–use the main reference books, explanatory and normative dictionaries of the Russian language
	own	–creating skills in Russian educated and logically consistent oral and written texts of academic and scientific themes of the reference-research character
GCC -8 - the ability to use the basics of philosophical knowledge to form a mindset	Know	–basic terms and concepts of philosophy, the history of the main areas of human thought
	able to	–conduct philosophical inquiry in accordance with the intended purpose and objectives, define the logic of the scientific research on the evaluation of their own activities

	own	–tools and techniques of scientific philosophical studies
GCC -10 - the ability to analyze the main stages and patterns of the society historical development for the formation of civic position	Know	–main stages of development of the main directions of philosophical thought (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign philosophy of science, philosophy debatable problems
	able to	–put a scientific problem, to justify its relevance, to define the logic of the scientific research on the evaluation of their own activities
	own	–tools and techniques of scientific philosophical studies
GCC -14 - the ability for self-organization and self-education	Know	–approaches to self-organization and self-education
	able to	–organize their professional activities, to improve their professional qualifications
	own	–methods and tools of self-organization and self-education

For the formation of the above competencies in the discipline "Philosophy", the following methods of active / interactive learning: lecture, conference, lecture-discussion method of scientific discussions, conferences, or round table, with the use of electronic forms of learning.

Course syllabus
"History"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.03.02 "History" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology, evidence supporting the order of the rector of 22.03.2017 № 12-13-485.

B1.B.03.02 discipline "History" is a compulsory subject of the base part of the curriculum of training bachelors in preparation 03.19.01 Biotechnology Profile "Molecular Biotechnology".

Total labor discipline is 3 credit units, 108 hours. Curriculum provides lectures (36 hours) and practical classes (18 hours), an independent student work (54 hours). Subject is implemented on 1 course in 2 semesters.

Subject logically and meaningfully related to the sciences in general, related to the field of social sciences: philosophy, political science, cultural studies, sociology, economic history and the foundations of the economy. The basis for the study of these subjects is history.

The aim of the course - form students a comprehensive understanding of the cultural and historical originality of Russia, its place in the global and European civilization. Form a systematic knowledge of the basic laws and characteristics of world-historical process, with emphasis on the study of Russian history. Contribute to the development of learning skills, analysis and synthesis of historical information. To the best of opportunities to enter into the circle of problems connected with the region of the future professional activity.

Objectives of the course:

- 1) development of key Russian historical development problems on the basis of modern approaches and assessments;
- 2) the formation of systematic knowledge about the peculiarities of the political, economic, social and cultural development of our country on the basis of comparative historical analysis of the historical process of world civilization;

3) the formation of a sense of citizenship, patriotism and internationalism, moral and ethical qualities;

4) understanding of the continuity of the historical process, preservation and enrichment of the historical memory of the great events of the distant and recent past, the glorious names and the deeds of their ancestors.

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

- knowledge of the basic facts, processes and phenomena that characterize the integrity of national and world history; periodization of world and national history;
- knowledge of modern versions and interpretations of the major problems of national and world history; historical implications of contemporary social processes;
- the ability to search for the historical information in the sources of various types;
- ability to establish causal relationships between phenomena, the spatial and temporal scope of the studied historical processes and phenomena;

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

Code and the wording of competence	Stages of formation of competence	
GCC-1 - the ability to self-improve and self-develop in the professional sphere for raising the general cultural level	Know	–methods of self-improvement and self-development in the professional field, methods to improve the cultural level
	able to	–self-improvement and self-development in the professional field, to raise the general cultural level
	own	–methods of self-improvement and self-development in the professional field, techniques for improving cultural level
GCC -2 – willingness to integrate into the scientific, educational, economic, political and cultural space of Russia and the APR	Know	–stages of the historical process (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign historical science, discussion problems of history
	able to	–put a scientific problem, to justify its relevance; –working with historical sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	–culture of thinking, the ability to synthesize, analyze, the perception of information. – scientific methods in historical science, with special historical methods, techniques borrowed from other

		disciplines; –techniques of discussion and debate.
GCC -10 - the ability to analyze the main stages and patterns of the society historical development for the formation of civic position	Know	–stages of the historical process (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign historical science, discussion problems of history
	able to	–put a scientific problem, to justify its relevance; –working with historical sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	–culture of thinking, the ability to synthesize, analyze, the perception of information. – scientific methods in historical science, with special historical methods, techniques borrowed from other disciplines; –techniques of discussion and debate.
GCC -14 - the ability for self-organization and self-education	Know	–ways of obtaining information
	able to	–receive and process information
	own	–methods of preparation, processing and transmitting information

For the formation of the above competencies in the "History" discipline, the following methods of active / interactive learning with the use of electronic methods: Problem lectures, method of scientific debate, round table.

Course syllabus
"Russian language and culture of speech (Business Communication) "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.03.03 "Russian language and culture of speech (Business Communication)" is written for professional educational program on a profile "Molecular Biotechnology" 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 03.19.01 Biotechnology basic professional educational programs , The level of higher education undergraduate, approved by order of the rector of 22.03.2017 № 12-13-485.

Subject B1.B.03.03 "Russian language and culture of speech (Business Communication)" is included in the base of the compulsory subjects of the educational program for undergraduate profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology.

The total complexity of development discipline is 2 credits, 72 hours. Curriculum provides practical training (18 hours), independent work (54 hours). Subject is implemented on 1 course in the 1 st semester.

Subject ", " Russian language and culture of speech (Business Communication) "is related to other disciplines PLEU:" History ", " Philosophy ", " Foreign Language ".

The development of this discipline must precede the writing of course and graduation papers, educational and industrial practices.

goal development of discipline ", " Russian language and culture of speech (Business Communication) "- the formation of the modern language of the person associated with the increase of students' communicative competence, expanding their general linguistic horizons, improving the ownership rules of oral and written literary language, the development of skills and abilities of effective verbal behavior in different communication situations.

Tasks:

1) instilling students ownership of the norms of modern Russian literary language, the theoretical foundations of speech as a set of qualities and communication system (correctness, clarity, accuracy, consistency, relevance, clarity, expressiveness and richness of speech);

2) disclosure of the functional-stylistic richness of Russian literary language (the specifics of the elements of all language levels in scientific language, genre differentiation, selection of language means in a journalistic style, language and style of methodical documents and commercial correspondence in the official style, etc.);

3) the development of linguistic flair and attitude assessment as your own and someone else's speech;

4) the formation of an open dialogue for the person having the highest rating in the system of modern social values;

5) learning the rules of language processing of documents of different genres;

6) deepening the skills of independent work with dictionaries and reference materials.

For successful study of discipline "Russian language and culture of speech" in students the following preliminary competence, formed as a result of learning in secondary school should be formed:

– knowledge of the general rules of spelling, punctuation, pronunciation, morphological and syntactic theory;

– skills with texts of different functional styles.

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

Code and the wording of competence	Stages of formation of competence	
GCC1 the ability to self-improvement and self-development in the professional field, to improve the cultural level	Know	–language in the life of modern society, especially the functioning of language as a basic means of communication
	able to	–use language means in different situations of communication
	own	–Use the skills of language means in different situations of communication
GCC6 the ability to understand, use, produce and competently express innovative ideas in Russian in discussions, publications, public discussions	Know	–particularly functional-style and genre differentiation of Russian literary language
	able to	–use different language means in different situations of communication in oral and written form, demonstrating knowledge of language norms
	own	–literacy skills and reasoned statement of the thoughts in oral and written communication in all situations

As part of the course "Russian language and culture of speech (Business Communication)" provides for the use of the following methods of interactive learning: business and / or role-playing game; A round table discussion, debate, debate, debate.

Course syllabus
"Logics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.03.04 "logic" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology, in its approved order of the rector of 22.03.2017 № 12-13-485.

The total complexity of development discipline is 2 scoring unit 72 hr. The curricula provided lecture (18 hr.) And practical (18 hr.) Classes, independent work (36 hr.). Subject is implemented in the 2nd semester of 1st year.

The study of logic contributes to the formation of correct thinking and other general cultural competence. The course focuses on the most traditional and symbolic logic, also taught how reasoned and evidence-based reasoning, the basic tendencies and directions of science of the laws of thought, dealt with examples of the use of logic in everyday life and professional activities.

Subject "Logic" is structurally and substantively associated with disciplines such as "Philosophy", "Mathematics", "Russian language and culture of speech" and takes into account their content.

When reading of the course at the same time take into account the content of his classical as well as modern methods of presentation and monitoring progress.

Goal:

mastering studying the culture of rational thinking, the practical application of its laws and regulations.

Tasks:

1) mastery of studying the logical culture, steady skills of accurate, consistent, consistent and evidence-based thinking; acquisition abilities practical implementation of various logical operations that achieved assimilation basic forms of logic concepts and analysis and display technologies, and the solution of the tasks and exercise;

2) development of students' skills of analytical thinking, including the ability to analyze the logic is correct and the actual truth of their own and other mental acts, the ability to carry out thought experiments to solve questions about the

logical relationships of the received information about the study object that is actively operate the conceptual logic device in situations with a specified or limited information ;

3) the formation of students' skills of conducting polemics. The ability to convincingly express its position, exposing a deep analysis of the position of opponents convincingly defend his point of view, to know the tricks of disputes and methods to neutralize them - all this makes the necessary professional skills in any field. Mastering the "logical component" polemical culture is the most effective means of mastering the culture of debate at all, because the debate is inseparable from the art of oratory, and logic from its inception, has always focused on the rhetorical questions;

4) applied use of teaching ideas, tools and methods of logic. Such use includes the ability to expose fallacies, to refute the unfounded arguments of opponents, nominate and analyze different versions to carry out classification and evidence be logically corrective action plans, size up the meaning and structure of reasoning.

To successfully study the "logic" of discipline among students following preliminary competences should be formed:

- the ability to express thoughts verbally and in writing in accordance with the grammatical, semantic and cultural norms of the Russian language;
- have an understanding of the world historical process.

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	
GCC1 the ability to self-improvement and self-development in the professional field, to improve the cultural level	Know	–methods of self-improvement and self-development in their professional activities, ways to improve the cultural level
	able to	–self-development and self-improvement in the area of their profession
	own	–skills to improve their professional skills, self-development, self-education, raising the cultural level
GCC3 ability to take initiative and to make responsible decisions, realizing their responsibility for their professional work results	Know	–ways to make the right decisions in difficult situations, the consequences of the decision
	able to	–take the initiative to make responsible decisions, take responsibility for them
	own	–skills to make responsible decisions, show initiative

GCC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in professional work
	able to	–use information technologies, modern methods and high-tech equipment in the work
	own	–skills of the use of information techniques and technologies in professional work
GCC14 the ability to self-organization and self-education	Know	–approaches to self-organization and self-education
	able to	–organize their professional activities, to improve their professional qualifications
	own	–methods and tools of self-organization and self-education
GPC-2 ability and willingness to use the basic laws of natural sciences in professional activities, the use of methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the basic laws of natural sciences, mathematical analysis and simulation
	able to	–apply the laws of the natural sciences, mathematical analysis and simulation
	own	–skills to use scientific knowledge, as well as mathematical methods in their professional activity

For the formation of the above competencies within the "logic" of discipline, the following methods of active / interactive learning: Lecture-discussion; problem lectures, "brainstorming", public speaking; Logical analysis of texts; problem solving, exercises, case studies; Working with online simulator "Logicon".

Course syllabus
"Economics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.03.05 "Economics" is made for professional education on the profile of the program "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology Approved by order of the rector of 22.03.2017 № 12-13-485.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides lectures (8 hours), independent work (100 hours). Subject is implemented on 1 course in 2 semesters.

Subject "Economics" is related to other disciplines PLEU: "Jurisprudence", "Mathematical Modeling".

Development of discipline "Economics" is necessary for the subsequent study of "Bioeconomics", "Management and economics of biotechnology."

a view to is the formation of students' basic knowledge about the laws of economics, the knowledge of real business practices of government, commercial and non-profit organizations, the study of advanced domestic and foreign management experience, in the field of economic regulation and control

Tasks:

1) form ideas about scientific and theoretical, methodological and practical foundations of the discipline;

2) to acquaint with the methods of solution of applied economic problems and situations, thereby strengthening the knowledge of economic laws and regularities;

3) to introduce the basic laws and regulations, as well as special literature in this area of knowledge.

Code and the wording of competence	Stages of formation of competence	
GCC -2 – willingness to integrate into the scientific, educational, economic, political and	Know	– stages of economic development (global and domestic), their objectivity and regularity of the latest achievements of domestic and foreign economic science, discussion problems of the

cultural space of Russia and the APR		economy
	able to	<ul style="list-style-type: none"> - put a scientific problem, to justify its relevance; - work with economic sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	<ul style="list-style-type: none"> - culture of thinking, the ability to synthesize, analyze, the perception of information. - scientific methods in economics, with special historical methods, techniques borrowed from other disciplines; techniques of discussion and debate.
GPC4 the ability to perceive and creatively use the achievements of science and technology in the professional sphere, in accordance with the needs of regional and global labor market	Know	- basic concepts, definitions, statements, and methods for solving economic problems.
	able to	- apply knowledge of basic concepts, definitions and methods of solving situational applications.
	own	- the skills of self-selection method for solving applied problems, proofs of the main claims, the application of knowledge of laws for applications.
GCC11 the ability to use the basics of economic knowledge in the various fields of activity	Know	- the basics of economic knowledge in the various fields of activity
	able to	- to use the basics of economic knowledge in the various fields of activity
	own	- the basics of economic knowledge in the various fields of activity
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technology	Know	- Methods of searching, storing, processing and analysis of information from various sources and databases, to represent it in a desired format, using information, computer and network technologies
	able to	- Use storage means, search, processing and analysis of information from various sources and databases, to represent it in a desired format, using information, computer and network technologies
	own	- Storage means, search, processing and analysis of information from various sources and databases, to represent it in a desired format, using information, computer and network technologies

For the formation of the above competencies in the discipline "Economics", the following methods of active / interactive learning: press conference lecture, drawing mind maps, work in small groups, whirlpool.

**Course syllabus "Jurisprudence"
educational profile of the program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology**

Course syllabus B1.B.03.06 "Law" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology, approved by order of the rector of 22.03.2017 № 12-13-485.

Subject is part of the basic curriculum and is mandatory. The complexity of discipline is 2 credits, 72 hours. Curriculum provides lectures (18 hours) and independent work of students (54 hours). Subject is implemented on 1 course in 2 semesters.

Subject serves one of the integrated in basic training of bachelors in this profile and is closely linked with disciplines such as "Economics", "History", "Philosophy".

goal study course "Law "is aimed at developing students' non-legal disciplines of legal culture and legal awareness, the ability to navigate in a professional and life situations from the standpoint of the law and rights.

Tasks:

- 1) form stable knowledge in law;
- 2) to develop the level of legal awareness and legal culture of students;
- 3) to develop the ability of perception and analysis of legal acts, including the application of this knowledge in their professional activities;
- 4) to shape and strengthen the skills of practical application of the law.

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

- the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their work.

As a result of the development of the discipline of students formed following general cultural competence:

Code and the wording of	Stages of formation of competence
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competence		
GCC -2 – willingness to integrate into the scientific, educational, economic, political and cultural space of Russia and the APR	Know	–stages of the historical process (global and domestic), their objectivity and regularity, the latest achievements of domestic and foreign historical science, discussion problems of history
	able to	–put a scientific problem, to justify its relevance; –working with historical sources; think critically about historical facts and events, to overcome the subjectivity and bias in their presentation, to conclude and argue their own position on the basis of the analysis of available information
	own	–culture of thinking, the ability to synthesize, analyze, the perception of information. –scientific methods in historical science, with special historical methods, techniques borrowed from other disciplines; techniques of discussion and debate.
GCC12 the ability to use the basics of legal knowledge in various fields	Know	–system of normative legal acts of the Russian Federation
	able to	–use regulations in its operations
	own	–proficiency in the use of regulatory legal acts in different spheres of life
GCC13 ability to work in a team, tolerant perceiving social and cultural differences	Know	–principles of operation of a professional team, to understand the role of corporate norms and standards
	able to	–work in a team, effectively carry out tasks of professional activity
	own	–methods of interaction with the staff, to perform various professional tasks and duties
GPC-4 the ability to understand the meaning of information in the development of modern information society, the consciousness of the dangers and threats arising in the process, the ability to comply with the basic requirements of information security, including protection of state secrets	Know	–Principles of information systems, understand the role of legal norms and standards
	able to	–work with information efficiently perform tasks of professional activity
	own	–methods of interaction with information, which is used to perform various professional tasks and responsibilities
PC-6 readiness for the implementation of the quality management	Know	–the main directions of the state policy in the field of biomedical cell products; –legal aspects of the implementation of biotechnology and biomedical technologies

system of biotechnological products in accordance with the requirements of Russian and international quality standards	able to	<ul style="list-style-type: none"> –use and meets the requirements of Russian and international legislation; –apply the results of the monitoring of advanced domestic and foreign experience in the field of advanced technology production of new biotechnology and biomedical cell products
	own	<ul style="list-style-type: none"> –norms and requirements of medical, biotechnological sciences, quality and cost, safety and environmental performance to create a biomedical cell products; –the basic principles of state policy in the field of biomedical cell technologies

For the formation of the above competencies within the framework of "Law" discipline, the following method of active / interactive learning: problem lectures, lecture-discussions, lectures, press conferences, lectures, discussions.

Course syllabus " Computer Science "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.04.01. "Computer Science" is written for professional educational program on a profile "Molecular Biotechnology" 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 ongoing basic professional educational programs in the undergraduate program 19.03.01 Biotechnology level higher education Bachelor approved by order of the rector of 22.03.2017 12-13-485. Subject is part of the basic curriculum, it is mandatory.

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

Subject "Informatics" associated with other disciplines PLEU: "Mathematical Modeling", "Bioinformatics", "Medical laboratory diagnostics technology."

Development of discipline "Computer science" is necessary for the acquisition of knowledge and skills, providing the ability to perform analytical processing experimental data represent the information in the form of a scientific paper, written work.

Goal: master modern means of computer technology, advanced software relating to the preparation and editing of documents, analysis and storage, information search, communication (capabilities of computer technology, which efficiently used to solve problems related to professional activities).

Tasks:

- 1) master the system of knowledge in computer science and its technology;
- 2) get the hang of the selection of information technology to solve a particular problem;
- 3) based on the characteristics information optimizing its processing;
- 4) understand the influence of the computer on the effectiveness of the implementation of programs, as well as to understand the peculiarities of the implementation of programs on the computer.

For successful study of discipline "Informatics" among students following preliminary competences must be formed: the capacity for self-organization and self-education

As a result of studying this discipline in students formed following general professional and general cultural competence (competency elements)

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	- modern methods and technology (including information)
	able to	- the use of modern methods and technologies in professional activity
	own	- Modern methods and technologies
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technology	Know	- Information, Computer and Network Technology
	able to	- search, storage, processing and analysis of information from various sources and databases, to represent it in the required format
	own	- Information, Computer and Network Technology
GPC-4 the ability to understand the meaning of information in the development of modern information society, the consciousness of the dangers and threats arising in the process, the ability to comply with the basic requirements of information security, including protection of state secrets	Know	- Principles of information systems, understand the role of legal norms and standards
	able to	- work with information efficiently perform tasks of professional activity
	own	- methods of interaction with information, which is used to vpolnneniya different professional tasks and duties
GPC-5 possession of basic methods, methods and means receiving, storing and processing information,	Know	- basic methods of receiving, storing, processing information
	able to	- to work with the computer as an information management tool

computer skills as an information management tool	own	- obtaining skills, storage and processing of information by means of computer technologies and systems
PC-12 willingness to use modern information technologies in their professional field, including database and application packages	Know	- modern information technologies in their professional field, including database and application packages
	able to	- use of modern information technologies in their professional field, including database and application packages
	own	- skills to use modern information technologies in their professional field, including databases and application packages

For the formation of the above competencies within the framework of "science" disciplines, the following methods of active / interactive learning: presentation using blackboard, books, videos, slides, computers, etc., followed by a discussion of materials, feedback to the formation of a common understanding of the level of ownership Knowledge of students, relevant to a class, the collective decision of creative tasks that require students not simple reproduction of information, and creativity, as the job contains more or Maine shy variation element, work in small groups (gives all students the opportunity to participate in the work, to practice cooperation skills, interpersonal communication).

Course syllabus
"Higher mathematics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.04.01 "Higher Mathematics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational in undergraduate program 19.03.01 Biotechnology.

Subject "Higher Mathematics" is included in the base portion and is mandatory for the study, implemented on 1 course in semester 1 and 2.

Total labor discipline is 4 units; 144 hours. Curriculum provides lecture (36 h.), Practical exercises (36 h.) And independent work of students (72 hours, including exam preparation 18 hours), the shape of the final control in the 1 and 2 semester - exam.

The course covers the main substantive elements of the following subject areas of mathematics: mathematical analysis (the foundations of set theory, function of one variable, limit and continuity of functions, differential and integral calculus of functions of one variable), the theory of probability and mathematical statistics. Course structure systematically reveals substantial portion of each of the subject areas course, building a logical connection there between.

Goal: acquisition students' knowledge and skills at the level of the educational requirements of the standards for the preparation of the disciplines to meet the requirements of these disciplines to mathematical training; develop students' logical thinking; raising the level of mathematical literacy and culture.

Tasks:

- 1) Students gain knowledge of basic mathematical concepts, formulas, statements and problem-solving techniques;
- 2) formation of skills to solve typical mathematical problems;
- 3) formation of the skills of mathematical technique applied to solve some of the problems that arise in their professional activities.

For successful mastering discipline requires knowledge base concepts and skills mandatory minimum content (complete) forming on mathematics, approved

by Order of the Ministry of Education 30.06.99 № 56, following preliminary competence to be formed:

- subject, the rate math average (full) training;
- ability to learn and a desire for knowledge;
- ability to work in a team and independently;
- ability to communicate in oral and written forms in Russian for solving the problems of interpersonal and intercultural communication.

As a result of studying the discipline the following competencies (competency elements) are formed by the trainees.

Code and the wording of competence	Stages of formation of competence	
GPC4 the ability to perceive and creatively use the achievements of science and technology in the professional sphere, in accordance with the needs of regional and global labor market	Know	–basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.
	able to	–apply knowledge of basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.
	own	–the skills of self-selection method for solving mathematical problems mathematical analysis, probability theory and mathematical statistics of varying difficulty, evidence of major claims, the use of mathematical tools to solve applied problems.
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.
	able to	–apply knowledge of basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.
	own	–the skills of self-selection method for solving mathematical problems mathematical analysis, probability theory and mathematical statistics of varying difficulty, evidence of major claims, the use of mathematical tools to solve applied problems.
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of	Know	–basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.
	able to	–apply knowledge of basic concepts, definitions, statements, and methods for solving problems of mathematical analysis, probability theory and mathematical statistics.

mathematical analysis and modeling, theoretical and experimental research	own	–the skills of self-selection method for solving mathematical problems mathematical analysis, probability theory and mathematical statistics of varying difficulty, evidence of major claims, the use of mathematical tools to solve applied problems.
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For the formation of the above competencies within the discipline of "Higher Mathematics", the following active learning strategies: problem-based learning.

**Course syllabus "Physics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology**

Course syllabus B1.B.04.03 "Physics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology. The discipline is included in the basic part of the curriculum, it is compulsory.

The total complexity of mastering the discipline is 5 credit units, 180 hours. The curriculum includes lectures (36 hours), practical exercises (18 hours), laboratory work (36 hours), independent work (90 hours, of which 54 hours are for exam preparation). The discipline is implemented on 1 course in 1, 2 semesters.

For the formation of the initial competence profile of the student, it is preliminarily desirable to study such disciplines as Informatics, Mathematics. The knowledge, skills and abilities formed in the course of studying the discipline are implemented in such disciplines as Electrical Engineering and Electronics, Processes and Apparatus of Biotechnology, as a basis for understanding the content of these disciplines and forming a general scientific picture of the world, for setting up experiments, carrying out the necessary measurements and processing their results ...

The purpose of the discipline: equipping students with knowledge of the physical foundations of technology and technology, physical methods of research and measurements, creating the necessary basis for studying the disciplines of the professional cycle, for improving the general culture.

Discipline objectives:

- 1) formation of a system of physical concepts;
- 2) the formation of the basic concepts of the modern physical picture of the world on the basis of studying the foundations of the most important physical theories;
- 3) familiarization of students with the most important applied aspects of physics;
- 4) familiarization of students with the humanitarian aspects of physical knowledge, formation of the basis for improving the general culture of the student, his ecological education;
- 5) familiarization of students with physical methods of research and product quality control;
- 6) familiarizing students with the method of modeling physical phenomena, including using a computer;

7) the formation of skills for the statistical processing of the results of the experiment, their interpretation;

8) the formation of skills in planning an experiment and its organization;

9) developing practical skills in working with measuring instruments, assessing the accuracy and reliability of the results.

For the successful study of the discipline "Physics", students must have the following preliminary competencies:

- the ability to use the basic physical concepts and foundations of physical theories, obtained in the course of high school physics for the analysis and explanation of processes in nature and technology;

- the ability to use the basics of mathematical analysis and vector algebra;

- the ability to solve the simplest physical problems using analytical and graphical methods;

- the ability to carry out the simplest measurements of physical quantities;

- possession of skills in working with educational literature;

- possession of the skills to use the simplest measuring instruments;

- possession of the skills to formulate the results of observations, experiments and calculations.

As a result of studying this discipline, students develop the following general professional, professional competencies (elements of competencies):

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in professional work
	able to	–use information technologies, modern methods and high-tech equipment in the work
	own	–skills of the use of information techniques and technologies in professional work
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–basic laws of physics to the extent necessary for an understanding of the basic laws of the physical, chemical, biochemical and biotechnological processes
	able to	–to determine the possibility of using the basic knowledge of physics to professional applications
	own	–methods of analysis of scientific data, experimental methods of study based on the use of basic knowledge of physics
GPC 3 the ability to apply knowledge of modern physical picture of the	Know	–fundamental areas of physics to the extent necessary for an understanding of the basic laws of the physical, chemical, biochemical and biotechnological processes
	able to	–use basic physics knowledge to explain the phenomena

world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena		of nature, the work of technical devices and technological processes, solving problems
	own	–methods of analysis and ordering information received, process modeling and phenomena to identify the basic laws of their occurrence
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	Know	–ways and methods for measuring the basic physical parameters in biotechnological production
	able to	–implement process in accordance with the regulations and to measure the main parameters of biotechnological processes
	own	–measurement of physical skills of process parameters, the properties of raw materials and products of the process

For the formation of the above competencies within the "Physics" discipline, the following methods of active / interactive learning: lecture-discussion, lecture in PowerPoint format.

Course syllabus
"Math modeling"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.04.04 "Mathematical Modeling" is made for the "Far Eastern Federal University" professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs towards preparing 19.03.01 Biotechnology. "Mathematical Modeling" is included in the compulsory subjects Physics and Mathematics module core part of the curriculum.

The total complexity of the development of the discipline of 3 credit units, 108 hours. Curriculum in this area provided lectures (18 hours, including 2 hours MAO), practical studies (36 hours, including MAO 18 hours), independent work (54 hours), Ladder. Subject is realized on the 2 course in 5 semester.

Subject "Mathematical modeling" based on the knowledge and skills obtained from study subjects "Higher Mathematics", "Informatics", "Economics" and it allows you to prepare the student to the study of such subjects as "Fundamentals of Design" "Industrial Ecology" "Processes and apparatuses biotechnology", "Protein engineering, "" scientific design and research methodology "," Bioinformatics "," Bioengineering ", to prepare for the passage educational and industrial practices and writing of the final work.

The content of the discipline consists of three sections and covers the following issues:

– modeling and optimization of the elements based on the linear and dynamic programming: general nonlinear programming problem, admissible sets, optimization criteria and the objective function, geometric interpretation; the problem of linear programming (LP), examples of LP problems; normal (standard) and canonical forms PL; admissible set LP problem, properties; optimal solution properties; the absence of an optimal solution to the LP problem; dual LP problem, dual variables, their meaning and interpretation; sensitivity analysis of LP problems, its use; Graphical method for solving a particular LP problem; method for solving LP problems, vertices (simplex method); solution of LP problems in MS Excel environment; objective optimization of biotechnological production; Transport LP problem, examples of its use for

modeling and optimization; formulation discrete problem of dynamic programming (DP). structure and basic elements; function, equation and Bellman's optimality principle; DP algorithm for solving tasks, direct and reverse calculations; Examples of standard DP tasks, equipment operation.

– elements of decision theory and the multi-criteria optimization: Criteria based selection description language, quantitative and qualitative criteria for measuring the scale; formulation optimization problems typical multi-criteria selection, a plurality of alternatives; Examples of multi-criteria linear programming problems; binary relations on the set of alternatives, their types and properties; Pareto optimal under several criteria Pareto boundary; feature selection, the lack of a universal group decisions matching method (Arrow's theorem); a metric criterion space, the method of reference (ideal) points to find effective solutions; hierarchy of criteria and importance weight, method of main criterion; constrained optimization methods, the method of concessions; the use of generalized criteria linear maximin and other convolution.

– elements of network planning and management in the enterprise: the typical network planning and management tasks (SPU), project-based approach to the planning of technological and business - processes, methods CPM and PERT; Network graph elements and building regulations; key timing specifications of the network schedule and its key elements, critical indicators and ways; line graph Gantt chart and resource utilization; SPU optimization problem, optimization of the acceleration of projects costs; optimizing the use of resources in the network processes at their deficit; optimization of classical streams on networks and other tasks.

The purpose of discipline- the skills of mathematical modeling of typical chemical and biological, technological, design and organizational processes in the biotech industries. As well as the development of some methods of optimization processes and effective decision-making based on adequate mathematical modeling.

Main goals:

1) formation and assimilation of studying the theoretical foundations of mathematical modeling of biotechnological production in volume and format required for Molecular Biotechnology,

2) shape matching skills and construct a mathematical model of adequate specific objectives of the production process,

3) learn how to interpret the results of mathematical modeling and optimization and apply them to study business and management decisions,

4) learn the basic process control methods based on network models,

5) form the basis for further independent study of mathematical modeling techniques and analysis of technological, industrial and business processes for forecasting purposes or optimization.

For successful study of discipline "Mathematical Modeling" in students the following preliminary competences should be formed:

- the ability to perceive and creatively use the achievements of science and technology in the professional field;
- ability to work with the computer as an information management tool, get it from a variety of sources, including global computer networks;
- the ability to use basic methods of natural sciences in professional activities for theoretical and experimental research;
- the ability to use mathematical apparatus and tools for processing, analyzing and organizing information.

As a result of studying this discipline in students formed following general cultural and general professional competence:

Code and the wording of competence	Stages of formation of competence	
GPC4 the ability to perceive and creatively use the achievements of science and technology in the professional sphere, in accordance with the needs of regional and global labor market	Know	–classification and development trends of modern mathematical methods and IT- tools used in the production activity.
	able to	–creative use of basic and advanced methods of mathematical modeling and optimization to compete in regional and global labor markets.
	own	–skills to perceive and use advances in mathematical modeling and optimization of modern biotechnology for the organization of production efficiency.
GPC5 the ability to use modern methods and technologies (including information) in their professional activities.	Know	–basic methods of linear programming and multi-criteria optimization, suitable for various conditions and purposes biotech industries
	able to	–use standard information technology and mathematical methods for adequate modeling and optimization in meeting the challenges of professional work.
	own	–skills of mathematical modeling and multi-criteria optimization for effective decision-making for the organization and management of production processes.
GPC-1	Know	–information, computer and network technologies;

the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technology		–Search methods, storage, processing and analysis of information from various sources and databases
	able to	–search, storage, processing and analysis of information from various sources and databases, to represent it in the required format
	own	–the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technology
GPC- 2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the necessary mathematical tools and general scientific modeling and optimization of technological and manufacturing processes.
	able to	–the use of standard mathematical models of network planning of production processes and management, and experimental studies.
	own	–System and methods of mathematical analysis, linear and multi-criteria optimization solutions for professional and scientific tasks within the models used.
PC-11 knowledge of methods of experimental design, processing and presentation of the results	Know	–predetermined system methodology and results of a mathematical analysis; –methods of measurement, monitoring and drawing up the description of the research; compilation of data for surveys, reports and scientific publications
	able to	–process the results of research and development;
	own	–mathematical methods of experimental design, processing and presentation of the results

For the formation of the above competencies in the discipline "Mathematical Modeling", the following methods of active / interactive learning: lecture-presentation, lecture, discussion, counseling method, Case-study, brainstorming, group and individual performing creative tasks.

Course syllabus
"General and Inorganic Chemistry "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.05.01 "General and Inorganic Chemistry" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides lectures (36 hours), laboratory exercises (36 hours) and practical classes (36 hours), an independent student work (108 hours, of which the preparation for the exam 36 hours). Subject is implemented on 1 course in the 1 semester.

Subject "General and Inorganic Chemistry" covers the range of problems associated with the structure and properties of substances, their reactivity, the basic laws of chemistry, the concept of the labeling substances of the chemical reactions mechanisms. Considers the prospects for the use and application of chemicals Development of discipline "General and Inorganic Chemistry" is necessary for the subsequent study subjects Organic chemistry ", "Bioorganic chemistry", "Physiology of the basics of anatomy. "

Goals development of the discipline "General and Inorganic Chemistry" is the formation of students of modern ideas about the structure and properties of chemical substances, the regularities of chemical processes, the development of chemical thinking, give a summary of the most important for the chemistry of the theoretical concepts and laws that would allow the use of the vast chemistry inorganic material and organic compounds.

Tasks discipline "General and Inorganic Chemistry":

1) give a summary of the most important for the chemistry of the theoretical concepts and laws that would enable them to use the extensive material chemistry of inorganic and organic compounds;

2) to characterize the main classes of inorganic compounds.

For successful study of discipline "General and Inorganic Chemistry" in students the following preliminary competences should be formed:

– ability and willingness to analyze socially significant problems and processes to practice the methods of the humanities, social, economic, scientific, medical, biological and clinical sciences in a variety of professional and social activities;

– the ability and willingness to analyze the results of scientific, biomedical, clinical and diagnostic studies, use basic knowledge of human psychology and pedagogy methods in their professional activities, to improve their professional knowledge and skills, realizing at the same disciplinary, administrative, civil or criminal liability.

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

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in professional work
	able to	–select appropriate methods of studying the chemical composition of raw materials and finished products; –use information technologies, modern methods and high-tech equipment in the work
	own	–skills of the use of information techniques and technologies in professional work
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the basic laws of general and inorganic chemistry to the extent necessary for an understanding of the basic laws of the physical, chemical, biochemical, biotechnological processes;
	able to	–to determine the possibility of using a basic knowledge of general and inorganic chemistry for professional applications;
	own	–methods of analysis of scientific data, experimental methods of study based on the use of basic knowledge of chemistry
GPC 3 the ability to use knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand	Know	–modern ideas about the structure of inorganic and organic nature; –modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the

the surrounding world and natural phenomena		surrounding world and natural phenomena
	able to	–to understand the essence of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; to understand the nature of the chemical, biochemical, microbiological and other processes
	own	–complex knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena;
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	–plan and carry out the necessary research, to carry out processing of the results
	own	–the skills of the chemical processing of research, analysis and reporting of the results
PC-10 the ability to conduct standard and certification tests of raw materials, finished products and production processes	Know	–Standard materials testing methods, the finished biotechnological products and processes
	able to	–conduct standard and certification testing of raw materials, finished products and production processes
	own	–standard methods and certification testing of raw materials, finished products and production processes

For the formation of the above competencies in the discipline "General and inorganic chemistry", the following methods of active / interactive learning: problem lectures, tests, preparation of presentations.

Course syllabus
"Organic chemistry"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.05.01 "Organic Chemistry" composed for the "Far Eastern Federal University" professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs towards preparing 19.03.01 Biotechnology.

The total workload of the course is 6 credit units, 216 hours. The curriculum provides for lectures (36 hours), practical classes (36 hours), laboratory classes (72 hours) and student's independent work (72 hours, including 54 hours for exam preparation). The discipline is implemented on the 2nd course in the 3rd and 4th semesters.

Discipline B1.B.5.2 "Organic chemistry" is logically and meaningfully connected with such courses as "Inorganic chemistry", "Physical and colloidal chemistry", "Chemistry of biologically active substances", "Biochemistry", "Engineering enzymology", "Industrial microbiology and biotechnology".

The purpose studying the discipline is the formation of a complex of knowledge in organic chemistry and bioorganic chemistry for the subsequent deeper study of disciplines of the basic level of the professional cycle, necessary for the successful implementation of the professional activity of a bachelor, and practical skills in using knowledge for technochemical control, determining the safety and quality of production, determining chemical properties solutions and systems and processes occurring in them, to improve the technological properties of systems.

Discipline objectives:

1) formation of knowledge in the field of the theory of structure, reactivity, methods of synthesis and chemical properties of organic substances, necessary to control the chemical process.

2) formation of skills in searching for scientific information in the field of organic chemistry and organic synthesis, working with professional literature.

3) the formation of skills necessary for the implementation of the synthesis of organic matter according to a well-known method, its isolation, purification and identification by express methods.

4) formation of skills in processing experimental data and drawing up a report on the obtained experimental results.

5) formation of knowledge about the role of chemistry in the development of modern civilization, about the existing negative consequences of scientific and technological progress, about the contribution of organic chemistry to solving the problems of sustainable development.

6) formation of the ability to self-study and continuous professional self-improvement.

As a result of studying this discipline, students develop the following general cultural, professional and general professional competencies (elements of competencies):

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

Code and the wording of competence	Stages of formation of competence	
GCC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–basic information resources in the field of organic and bioorganic chemistry; modern techniques and methods of use of information technologies for the implementation of the tasks of research, management, design, methodology and activities; –the role of chemistry in the development of modern civilization, of existing negative consequences of scientific and technological progress, on the contribution of organic and bioorganic chemistry in solving the problems of sustainable development
	able to	–use advanced search technology and the transfer of information sources, the use of ICT solutions for the professional activity tasks
	own	–experience in creating electronic resources aimed at solving professional problems; experience of interaction on the Internet with other members of the educational process for the solution of scientific research; –research skills of scientific information in the field of organic chemistry and organic synthesis, work with professional literature
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling,	Know	–basic theoretical principles of organic and bioorganic chemistry; theoretical aspects of sampling and sample preparation facilities, which differ by their aggregate state; Theory and practical application of the basic methods of qualitative and quantitative chemical analysis; Theory and practical application of the basic physical and chemical methods of analysis

theoretical and experimental research	able to	–apply their knowledge to solve practical problems and formulation laboratory experiments of organic and bioorganic chemistry
	own	–professionally profiled knowledge and practical skills in the field of organic and bioorganic chemistry; theoretical work with educational and reference literature; Practical work with chemical glassware used in quantitative analysis, and the ability to handle complex analytical equipment; apply the knowledge in the study of the subsequent disciplines
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–theory of the structure, reactivity, synthetic methods and chemical properties of organic substances required for controlling the chemical process; –modern physical picture of the world, spatio-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
	able to	–to understand the essence of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; to understand the nature of the chemical, biochemical, microbiological and other processes
	own	–complex knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–the basic concepts of the theory of planning a chemical experiment; methods of organizing and conducting experimental studies
	able to	–to carry out the correct choice of the type of chemical experiment with its planning
	own	–proficiency in the use of chemical methods of planning the experiment; –basic methods and techniques of experimental research in molecular biotechnology
PC-10 the ability to conduct standard and certification tests of raw materials, finished products and production processes	Know	–basic methods and techniques of experimental research in molecular biotechnology methods based on organic and bioorganic chemistry; –standard and certification tests of raw materials, finished products and production processes based on methods of organic and bioorganic chemistry

	able to	–conduct standard and certification tests of raw materials, finished products and production processes based on methods of organic and biorganic chemistry
	own	–skills to organizing and conducting standard and certification testing of raw materials, finished products and processes; –theoretical methods and techniques of the standard and certification testing of raw materials, finished products and production processes in molecular biotechnology

For the formation of the above competencies within the discipline of "Organic chemistry", the following methods of active / interactive learning: problem lectures, method of small groups, practical classes, laboratory works.

Course syllabus
"Physical and Colloid Chemistry "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.05.03 "Physical and Colloid Chemistry" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours) and practical classes (18 hours), laboratory work (36 hours), independent work (72 hours, including 45 hours in preparation for the exam). Subject is implemented on 2 course 3 semester.

Subject "Physical and Colloid Chemistry" logically and meaningfully related to such courses as "Physics", "General and Inorganic Chemistry", "Analytical Chemistry", "Bioorganic Chemistry".

Development of discipline "Physical and Colloid Chemistry" is necessary for the subsequent study of "Fundamentals of Biotechnology", "Protein Engineering", "Bioorganic chemistry", "Biomedical cell technology. "

a view to of the discipline is to master the basics of future specialists of chemical and physico-chemical knowledge and techniques that are needed to address the issues of professional production, analysis, transport and storage of raw materials and finished products.

Tasks:

1) to study the laws of thermodynamics and the thermodynamic properties of substances in order to determine the possibilities and directions of technological processes;

2) learn how to use different properties of disperse systems and surface phenomena in pharmaceutical technology;

3) to form students' skills of independent work with educational and reference books on analytical chemistry.

Subject "Physical and Colloid Chemistry" is logically linked to the content of such courses as "Physics", "General and Inorganic Chemistry", "Analytical Chemistry", "Bioorganic Chemistry".

Development of discipline "Physical and Colloid Chemistry" is necessary for further study of such disciplines as "Industrial Ecology", "Biotechnology", "Molecular Pharmacology".

For successful study of discipline "Physical and Colloid Chemistry" in students the following preliminary competences should be formed:

- willingness to communicate orally and in writing in Russian and foreign languages to meet the challenges of professional work (GPC-2);
- willingness to solve common tasks of professional activity with the use of informational, bibliographic resources, biomedical and pharmaceutical terminology, information and communication technologies, and taking into account the main information security requirements (GPC-1).

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	
GCC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–Modern methods and technologies used in the Physical and Colloidal Chemistry and Molecular Biotechnology
	able to	–apply methods of physical and colloid chemistry and skills into practice in the course of performance of professional activities.
	own	–current methods and technologies related to the professional activities of a specialist, including information, technology, search and analysis of information.
GPC-2 ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–domestic and foreign achievements in science, technology and natural science fields, methods of mathematical analysis and modeling, theoretical and experimental research
	able to	–work with scientific and technical information, to use domestic and foreign experience in the field of natural sciences and molecular biotechnology to apply the methods of mathematical analysis and modeling, theoretical and experimental research
	own	–proficiency in the use of science and technology and natural science methods, application of methods of

		mathematical analysis and modeling, theoretical and experimental research
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–domestic and international developments in the field of natural science, physical and chemical aspects of the world picture, space-temporal patterns, the structure of matter
	able to	–use knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter in the field of molecular biotechnology
	own	–skills to use information about the modern physical picture of the world, the space-temporal patterns, the structure of matter
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–classification of enzymes, raw material sources of enzyme preparations, basic processing steps of production of enzyme preparations, the properties of polymer carriers for immobilizing enzymes, enzyme immobilization techniques, the properties of immobilized enzymes
	able to	–allocate the individual enzymes from natural objects carry clean them, to determine the total and specific activity of enzymes with various quantitative analysis techniques used to check the effectiveness of separation techniques taking into account the yield and purity of preparations obtained; –determine the basic kinetic parameters of the enzymatic reaction, to investigate the dependence of enzyme activity on the medium parameters, type of substrate, inhibitors presence
	own	–skills to use modern laboratory equipment and instruments (photoelectrocolorimeter, spectrophotometer, pH meter, etc.), as well as software for decoding and processing of the experimental data on the enzyme activity and kinetic characteristics of enzymes and their isozyme spectrum

PC-10 the ability to conduct standard and certification tests of raw materials, finished products and production processes	Know	–Standard methods of testing and certification of raw materials, finished products and production processes
	able to	–conduct standard and certification testing of raw materials, finished products and production processes
	own	–conduct standard and certification testing of raw materials, finished products and production processes

For the formation of the above competencies in the discipline "Physical and Colloid Chemistry", the following methods of active / interactive learning: discussion, problem method, experimental workshops.

Course syllabus
"Analytical chemistry and physico-chemical methods of analysis "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.05.04 "Analytical chemistry and physico-chemical methods of analysis" is written for professional education on the profile "Molecular Biotechnology" program 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 education towards training programs 19.03.01 "Biotechnology".

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours) and practical classes (18 hours), laboratory work (36 hours), independent work (72 hours, including exam preparation 45 hours). Subject is implemented on 2 course 3 semester.

Subject "Analytical Chemistry and physico-chemical methods of analysis" relates to other disciplines PLEU "General and inorganic chemistry", "Organic chemistry" and "Bioorganic Chemistry", "Physiology of the basics of the anatomy."

Mastering discipline "Analytical Chemistry and physico-chemical methods of analysis" necessary for subsequent study subjects "Fundamentals of Biotechnology," "Protein Engineering", "Bioorganic chemistry"," Biomedical cell technology. "

a view to development of discipline "Analytical chemistry and physico-chemical methods of analysis" It is the formation of system knowledge base patterns of chemical processes, chemical structure and properties of inorganic compounds for the ability to solve problems of chemical pharmacology.

Tasks discipline "Analytical chemistry and physico-chemical methods of analysis":

- 1) to form students' understanding of the purpose, objectives and methods of analytical chemistry, their importance in the practice of a pharmacist;
- 2) form students systematic knowledge of the chemical behavior patterns of the main classes of inorganic compounds in association with their structure to use this knowledge as a basis in the study at the molecular level processes occurring in the living body;

3) to form students' skills of independent work with educational and reference books on analytical chemistry.

For successful study course "Analytical chemistry and physico-chemical methods of analysis" in students the following preliminary competences should be formed:

–ready to use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems (GPC-7).

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	
GCC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–modern methods and technologies used in analytical chemistry and professional activities
	able to	–apply these methods of analytical chemistry and skills into practice in the course of performance of professional activities
	own	–current methods and technologies related to analytical chemistry, including information, technology, search and analysis of information.
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–domestic and foreign achievements in science, technology and natural science areas of analytical chemistry, mathematical analysis and modeling, theoretical and experimental research
	able to	–work with scientific and technical information, to use domestic and foreign experience in the field of analytical chemistry and molecular biotechnology to apply the methods of mathematical analysis and modeling, theoretical and experimental research
	own	–proficiency in the use of science and technology and natural science methods, theoretical and experimental research
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–domestic and foreign achievements in the domain of natural science, analytical chemistry, physical and chemical aspects of the world picture, space-temporal patterns, the structure of matter
	able to	–Molecular Biotechnology use knowledge of analytical chemistry, spatio-temporal patterns, the structure of the substance
	own	–skills to use information about the modern physical picture of the world, the space-temporal patterns, the structure of matter

PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–basic methods and techniques of experimental research in analytical chemistry and their professional field
	able to	–to conduct a qualitative analysis of cations and anions and qualitative chemical analysis of substances
	own	–skills to use modern laboratory equipment and instruments (photoelectrocolorimeter, spectrophotometer, pH meter, etc.), as well as software for decoding and processing of experimental data
PC-10 the ability to conduct standard and certification tests of raw materials, finished products and production processes	Know	–Standard methods of testing and certification of raw materials, finished products and production processes
	able to	–conduct standard and certification testing of raw materials, biotechnology products and process parameters
	own	–chromatographic methods of analysis, by ion-exchange chromatography, by gas chromatography, liquid chromatography, high performance liquid chromatography methods

For the formation of the above competencies in the discipline "Analytical chemistry and physico-chemical methods of analysis", the following methods of active / interactive learning: lecture - a press conference, a group experiment, discussion, problem method, experimental workshops.

Course syllabus
“Bioorganic chemistry”
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.05.05 "Bioorganic Chemistry" composed for the "Far Eastern Federal University" professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs towards preparing 19.03.01 Biotechnology.

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (36 hours) and practical classes (36 hours), laboratory work (18 hours), independent work (90 hours, including 36 hours in preparation for the exam). Subject is implemented on 3 course in 5 semester.

Subject "Bioorganic Chemistry" is related to other disciplines PLEU: "General and Inorganic Chemistry", "Analytical Chemistry", "Physical and Colloid Chemistry", "Organic Chemistry" and "Bioorganic Chemistry"

Development of discipline "Bioorganic Chemistry" is necessary for the subsequent study of "Fundamentals of Biotechnology", "Protein Engineering", "Biochemistry", "Molecular Pharmacology", "Pharmaceutical Biotechnology".

purpose obtaining current knowledge about the chemical structure and properties of the main classes of natural bioactive compounds.

Tasks:

1) formation of modern concepts of the structure and properties of the biologically active agents included in the living systems: amino acids, peptides, proteins, enzymes, nucleic acids, carbohydrates, lipids;

2) gaining knowledge about biologically active substances - products of secondary metabolism - bifunctional compounds, glycosides, alkaloids, polyphenolic compounds;

3) getting knowledge about the physiological action of biologically active substances to the human body;

4) getting knowledge of biologically active substances present in the plant material which is used for producing medicaments and pharmaceutical preparations;

5) formation of skills to assess the possibilities of vegetable raw materials used in the field of industrial and molecular biotechnology.

For successful study of discipline "Bioorganic Chemistry" "in students the following preliminary competences are to be formed

- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity;
- the ability to perceive and creatively use the achievements of science and technology in the professional sphere, in accordance with the needs of regional and global labor market;
- the ability to use modern methods and technologies (including information) in their professional 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	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in professional work
	able to	–use information technologies, modern methods and high-tech equipment in the work
	own	–skills of the use of information techniques and technologies in professional work
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the basic laws of chemistry of biologically active substances to the extent necessary for an understanding of the basic laws of the physical, chemical, biochemical, biotechnological processes;
	able to	–to determine the possibility of using the basic knowledge on the chemistry of biologically active substances for professional applications;
	own	–methods of analysis of the scientific information, experimental research methods based on the use of the basic knowledge of chemistry of biologically active substances
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of	Know	–Forums fundamental chemistry of biologically active substances to the extent necessary for an understanding of the basic laws of chemical, biochemical, biotechnological processes;
	able to	–use the basic knowledge of chemistry of biologically active compounds in order to explain

matter to understand the surrounding world and natural phenomena		the nature of the phenomena of biotechnological processes
	own	–methods of analysis and ordering information received, process modeling and phenomena to identify the basic laws of their occurrence
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	–evaluation methods and means of biotechnological processes; –methods of using biologically active substances in biotechnology with the environmental impact of their use; –methodology application monitoring the quality and safety of biologically active substances in Biotechnology
	able to	–evaluate the biotechnological processes in terms of the environmental consequences of their application
	own	–skills assessment of biotech processes in terms of the environmental consequences of their application
PC-9 possession of the main methods and techniques of experimental research in their professional field; ability to carry out standard and certification tests of raw materials, finished products and production processes	Know	–basic methods and techniques of experimental research of biologically active substances in Molecular Biotechnology
	able to	–conduct experimental research in their professional field, to carry out standard and certification testing of raw materials, finished products and biotechnological processes
	own	–skills of experimental research in their professional areas of the standard and certification testing of raw materials, finished products and biotechnological processes

For the formation of the above competencies in the framework of "Bioorganic Chemistry" discipline, the following methods of active / interactive learning: problem lectures, lecture-discussion, a round table, an active reading.

Course syllabus
" Life safety"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.06.01 «Health and safety» is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational in undergraduate program 19.03.01 Biotechnology

Subject is part of the basic curriculum, it is mandatory.

The total complexity of development discipline is 2 credits, 72 hours. Curriculum provided lectures (4 hours), practical studies (18 hours), laboratory work (not provided) independent work (50 hours), the offset. Subject is realized on the 2 course in 4 semester.

a view to study of discipline is formation of students' ideas about the indissoluble unity of effective professional activity with the requirements of security and human safety in the working environment that guarantees the preservation of health and human health, provide adequate behavior in extreme conditions.

Tasks:

- 1) formation of the system of knowledge in the field of health and safety;
- 2) study of species harmful factors affecting operating in the normal course of business;
- 3) study of the principles, methods and security products;
- 4) study of regulatory requirements for working conditions;
- 5) study of the conditions of assessment methods according to the degree of hazard and risk;
- 6) the formation of students' skills to assess the environment and the development of science-based protection measures aimed at the prevention of occupational diseases, injuries, accidents and reduction of technogenic and anthropogenic impact on the biosphere.

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

– the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technologies;

– the ability to possess - knowledge of basic laws of the structure and functioning of the biosphere, the peculiarities of technogenic impact of global environmental issues and environmental principles of sustainable use of natural resources, instruments and technologies;

As a result of studying this discipline, students develop the following general cultural (GC), general professional (OPK) and professional (PC) competencies (elements of competencies):

Code and the wording of competence	Stages of formation of competence	
GCC3 ability to take initiative and to make responsible decisions, realizing their responsibility for their professional work results	Know	–definition of emergency, the types of emergencies, emergency stage applied principles of safety in emergency situations
	able to	–determine the necessary types of work related to emergency, to be carried out in a particular situation
	own	–methods of protection and first aid techniques
GCC9 willingness to use basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters	Know	–Know the kinds of applicable standards and criteria, measurement units, guided in their values
	able to	–use hygienic criteria in terms of the working environment and the criteria to assess the damage to the environment
	own	–methodology to assess the actual working conditions in comparison with the regulations
GCC13 ability to work in a team, tolerant perceiving social and cultural differences	Know	–a system of legal and regulatory documents in the field of security safety (SSTB) and environmental protection
	able to	–use regulations OSSS
	own	–knowledge in the field of methodological approaches in the evaluation of the actual working conditions with the use of Occupational Safety Standards System regulations
GPC-6 possession of the main methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters	Know	–Know the principles, methods and means of ensuring the safety of life in industrial conditions and in emergency situations of natural and technogenic origin
	able to	–differentiate applied in industrial conditions and in emergency situations the principles, methods and security features
	own	–tools and methods of analysis in production conditions and in emergency situations of natural and technogenic origin

PC-4 the ability to ensure compliance with safety regulations, industrial hygiene, fire and occupational safety	Know	–risks associated with the anthropogenic impact on the biosphere
	able to	–to draw conclusions about the sources of negative impact on the environment
	own	–methodological approaches to the assessment of human impact on the environment, methods of ensuring safety, industrial hygiene, fire and occupational safety

For the formation of the above competencies in the discipline, «Health and safety», the following methods of active / interactive learning: lectures with presentations, practical work.

**Course syllabus
"Industrial ecology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology**

Course syllabus B1.B.06.02 "Industrial Ecology" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs towards preparing 19.03.01 Biotechnology.

Total labor discipline is 3 credits, 108 hours. Curriculum provides lectures (18 hours) and practical classes (36 hours), laboratory exercises (36 hours) and independent work of students (18 hours). Subject is implemented on 3 course of 6 semester.

Subject "Industrial Ecology" logically and meaningfully related to such courses as "Health and Safety", "biochemistry", "Organic Chemistry" and "Bioorganic Chemistry", "General and Inorganic Chemistry."

a view to discipline is formation of knowledge of theoretical foundations of industrial ecology as a system of technological, economic, biological, social and other ties between man, objects of economic activity and the environment, the skills of drawing up an action plan for the protection of air and water resources, land resources.

Tasks

1) assimilation evaluation criteria of production efficiency, the overall patterns of manufacturing processes, process systems (TC);

2) forming abilities of application of the basic industrial methods for purification of waste gases and wastewater main industrial processing methods and use of waste production and consumption, as well as methods of elimination and disposal of hazardous industrial waste;

3) the skills of drawing up an action plan for the protection of air and water resources, land resources;

4) to monitor compliance with applicable rules, regulations and standards.

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

Code and the wording	Stages of formation of competence
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of competence		
GCC3	Know	–ways to make the right decisions in difficult situations, –consequences of the decision, a measure of responsibility for their professional work results
	able to	–make responsible decisions, take responsibility for them
	own	–responsible decision-making skills, responsibility for their professional work results
GCC9	Know	–basic methods of environmental protection during disasters
	able to	–use hygienic criteria in terms of the working environment and the criteria to assess the damage to the environment
	own	–assessment methodology actual production conditions in comparison with the normative requirements
GPC-3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–modern physical picture of the world, spatio-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; general concepts of Russian legislation in the field of environmental safety
	able to	–to understand the essence of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; understand the nature of the chemical, biochemical, microbiological and other processes occurring in biotechnological processes; classify industrial waste
	own	–complex knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; complex knowledge, which allows to assess the impact of air pollution, water and soil pollution on human health and the environment
GPC-6 possession of the main methods of protection of industrial workers and the public from the possible	Know	–basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes

consequences of accidents, catastrophes, natural disasters	able to	–protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	–skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters
PC-2 capacity for the implementation and management of biotechnological processes	Know	–biotechnological processes
	able to	–implement and manage biotechnological processes
	own	–methods of implementation and management of biotechnological processes
PC-3 to assess the readiness of facilities and technology, taking into account the environmental consequences of their application	Know	–hardware and technology, taking into account the environmental consequences of their application
	able to	–apply methods of mathematical analysis and modeling, theoretical and experimental research
	own	–method of mathematical analysis results of field and laboratory studies
PC-7's ability to organize and summarize the information on the formation and use of resources of the enterprise	Know	–methods of ordering and generalization of the information on the use and development of resources, innovation and design stages of the project management methods, types of presentation, the structure of presentation planning framework for the compilation of reports on the results of the work performed
	able to	–work with special literature fundamental and applied nature and sources of information on the use and development of resources to analyze the project (innovation) as a control object, to develop and to make a presentation on the results of the work done and to be able to make out the results of research in the form of articles and reports
	own	–methods of organization and synthesis of information on the use and development of resources, project analysis methods (innovation), the art of public speaking, oratory
PC-18 readiness to participate in the research of biotechnological process for experienced	Know	–directions biotechnology research
	able to	–explore biotechnological processes on experimental and pilot plant

and pilot plant	own	–methods of research of biotechnological processes on experimental and pilot plant
PC-19 readiness to participate in the development of design and working of technical documentation	Know	–basic design and operational technical documentation, standards, specifications and other normative documents
	able to	–find the necessary information and the original data in the standards, technical conditions and other normative documents
	own	–skills to design the finished design work

For the formation of the above competencies in the discipline "Industrial Ecology", the following methods of active / interactive learning: problem lectures, method of small groups, practical classes, laboratory works.

Course syllabus
" Labor protection and industrial sanitation"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.06.03 " Labor protection and industrial sanitation " is written for professional educational program on a profile "Molecular Biotechnology" 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 ongoing basic vocational education towards training programs 19.03.01 Biotechnology .

Total labor discipline "Occupational Health and Sanitation" is 3 units, 108 hours. Curriculum provides lectures 18 hours, practical classes 36 hours, independent work of the student 54 hours credit. Subject is implemented on 3 course of 6 semester.

Subject "Occupational Health and Sanitation" logically and meaningfully related to such courses as "Health and Safety", "Industrial Ecology", "Industrial microbiology and biotechnology."

Contents covers the following issues: the study of occupational safety, health and hygiene, including design, equipment, maintenance of biotechnological productions.

Goal: the formation of the ability to use professional activity acquired knowledge and skills to ensure optimal conditions of production in the sphere of professional activity, understanding of the priority issues related to sanitary and hygienic aspects in the biotechnological industries; development of students' theoretical knowledge, acquire skills in the design, equipment, maintenance biotech industries necessary for professional activities.

Tasks:

- 1) study of the general provisions and legislative framework of labor protection;
- 2) mastering methods of analysis and evaluation sanitary manufacturing conditions;
- 3) development of sanitary-epidemiological examination of construction projects companies biotech industries.

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

Code and the wording of competence	Stages of formation of competence	
GCC9 willingness to use basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters	Know	–types of emergencies and their consequences
	able to	–determine the types of protection methods for a specific emergency
	own	–Knowledge about the technique of behavior in emergency situations
GPC-6 possession of the main methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters	Know	–basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	–protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	–skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	–basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	–protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	–skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters
PC-4 the ability to ensure compliance with safety	Know	–safety, industrial hygiene, fire safety and safety standards
	able to	–to organize the work in accordance with safety

regulations, industrial hygiene, fire and occupational safety		regulations, occupational health, fire and safety standards
	own	–skills of safe work in accordance with safety regulations, occupational health, fire and safety standards
PC-5 the ability to organize the work of artists, find and make administrative decisions in the field of organization and regulation of labor	Know	–the basic processes in the organization and conducting of biotechnological processes
	able to	–apply basic knowledge about the characteristics and processes of the organization and conducting of biotechnological processes with regard to the implementation of safety rules, industrial hygiene, fire and occupational safety
	own	–main methods of organizing and conducting of biotechnological processes and standardization of labor with a view to ensuring the implementation of safety rules, industrial hygiene, fire and occupational safety

For the formation of the above competencies in the discipline «Occupational Health and Sanitation" , the following methods of active / interactive learning: lecture, discussion, seminar discussions, seminars, press conference.

Course syllabus
" Engineering graphics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.07.01 " Engineering graphics " compiled for the professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major professional training in the direction of 03.19.01 Biotechnology. Discipline B1.B.7.1 "Engineering Graphics" is the basic part of the compulsory disciplines of the curriculum. The total workload of the discipline is 3 credit units, 108 academic hours. The curriculum includes lectures (18 hours), practical work (36 hours), independent work of students (54 hours). The discipline is implemented on 1 course in 2 semester.

Discipline "Engineering Graphics" related to other disciplines of OBOP "Design Basics", "Electrical Engineering and Electronics", "Processes and Apparatus of Biotechnology".

The purpose study discipline is the formation of students' knowledge, abilities, skills and competencies in the field of information technology systems for computer-aided design and processing of graphic information for their further use in professional activities.

Tasks:

- 1) study of the theoretical foundations of the presentation of graphic data, methods and means of computer graphics and geometric modeling; classification of information technology systems for computer-aided design and processing of graphic information; graphics system problems;
- 2) the ability to use in practice software tools for computer-aided design and processing of graphic information;
- 3) familiarization with practical methods of using modern computer-aided design systems, processing raster and vector graphics in professional activities.

For the successful study of the discipline "Engineering Graphics", students must have the following preliminary competencies:

– the ability to search, store, process and analyze information from various sources and databases, to present it in the required format using information, computer and network technologies.

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

Code and the wording of competence	Stages of formation of competence	
GPC4 the ability to perceive and creatively use the achievements of science and technology in the professional sphere, in accordance with the needs of regional and global labor market	Know	–the value of science and technology in the professional sphere, in accordance with the needs of regional and global labor market
	able to	–use science and technology in the professional sphere, in accordance with the needs of regional and global labor market
	own	–generalization skills, analysis, perception of information, the ability to perceive and creatively use the achievements of science and technology in the professional sphere
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–Theoretical basics of reporting, the basic concepts of modern methods and technologies (including information) in professional activity
	able to	–the use of modern methods and technologies (including information) in professional activity
	own	–Methods of application of information technology systems, computer-aided design and processing image information in a professional activity.
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–possibility of searching, storing, processing and analysis of information from various sources and databases
	able to	–represent graphic information in the required format using the information, computer and network technology
	own	–the method of application of the basic laws of natural sciences in professional activities; methods of mathematical analysis and modeling, theoretical and experimental research
PC-14 willingness to use modern computer-aided design	Know	–concepts, concepts, principles and methodology of modern systems of computer-aided design and engineering projects; –model programs aided design; –principles on the use of standard computer-aided design programs; –the main stages of computer-aided design
	able to	–the use of modern computer-aided design and computer-aided design standard tools;

		<ul style="list-style-type: none"> –work programs, necessary in computer-aided design; –to apply this knowledge to the specific computer-aided design; –organize and develop projects of automated biotechnological production
	own	–skills of using modern computer-aided design
<p>PC-15</p> <p>the ability to design processes using automated technological preparation of production systems in the group of authors</p>	Know	<ul style="list-style-type: none"> –Basis of technological calculations for the design of new or modernization of existing facilities and production sites of production of biotechnology products; –methods of carrying out calculations for the design of biotechnological production, production lines, workshops, individual sections of enterprises using computer-aided design systems and software, –information technologies when creating projects newly built and reconstruction of existing enterprises
	able to	–carry out the calculation and design of the individual process steps using the automated preparation process production systems
	own	–skills of calculations for the design of production of biotechnological products, production lines, workshops, individual sections of enterprises using computer-aided design systems and software, information technology when creating projects newly built and reconstruction of existing enterprises
<p>PC-19</p> <p>willingness to participate in the development of design and working of technical documentation</p>	Know	–review, classification and basic functionality of modern information technology processing image information in the development of design and working of technical documentation
	able to	–to practice the basic functionality of the modern information technologies of processing graphics and computer-aided design in the development of design and working of technical documentation in the professional field
	own	–the method of application of the key features

		of modern information technologies of processing graphics and computer-aided design in the development of design and working of technical documentation in the professional field
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For the formation of the above competencies in the discipline "Engineering and Computer Graphics" in lectures and laboratory classes used projection technology, as well as the following methods of active / interactive learning:

- interactive lectures;
- lecture presentations.
- work with visual aids, video and audio recordings;
- interactive form multimedia-feed material;
- methods of IT - the use of computers for access to Internet resources, the use of training programs in order to expand the information field, increasing the speed of processing and transmission of information;
- anticipatory self-study - the study of the students of the new material before its presentation to the teacher lectures and other classroom;
- problem-based learning - encouraging students to independent "production" of knowledge required to solve a particular problem;
- tests.

Course syllabus
" Fundamentals of Biotechnological Production Design "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.07.02 "Fundamentals of biotechnological productions" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major professional education in undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (36 hours), independent work of students (54 hours), set-off. Subject is implemented on 3 course in 5 semester.

Mastering discipline is parallel and closely related to the study subjects: "Processes and apparatuses biotechnology", "Industrial Microbiology and Biotechnology", "Management and Economics in biotechnology" et al.

Goal:

to prepare students for the production, design activities related to the organization of the study design, project documentation, selection rules and calculation of technological equipment, workshop layout, needed to address issues of professional production and to have an idea: the basics of the design process of the industry.

Tasks:

- 1) the formation of students the system of knowledge about the methods and stages of development;
- 2) secure design skills enterprises Industrial Microbiology;
- 3) mastery of the methods of the design process.
- 4) mastering the technique of designing in AutoCAD.

For successful study of discipline "Fundamentals of biotechnological productions" in studying the following prior knowledge and skills should be formed:

- willingness to communicate orally and in writing in Russian and foreign languages to meet the challenges of professional activity;
- the basics of biology, biochemical characteristics of the main sub-cellular

components, the basic laws of animal and plant reproductive biology;

- understanding of the fundamental principles and levels of biological organization, regulatory mechanisms operating at every level;

- representation of the structure of the gene, mutagenesis, the principles of genetic engineering of population genetics and evolutionary genetics, genetic bases and methods of breeding;

- the effects of human impacts on the biosphere, ecological principles of environmental management

- of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and the phenomena of nature.

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

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in professional work
	able to	–use information technologies, modern methods and high-tech equipment in the work
	own	–skills of the use of information techniques and technologies in professional work
PC-13 ability to participate in the development of technological projects in the group of authors	Know	–basic procedures for the development of technological projects in the group of authors
	able to	–follow the procedures and protocols of the development of technological projects in the group of authors.
	own	–skills to work on technology projects as part of a group of authors
PC-14 willingness to use modern computer-aided design	Know	–basic modern computer-aided design
	able to	–the use of modern computer-aided design
	own	–skills to use modern computer-aided design

<p>PC-15</p> <p>the ability to design processes using automated technological preparation of production systems in the group of authors</p>	Know	–methods of designing processes using automated technological preparation of production systems in the group of authors
	able to	–design processes using automated technological preparation of production systems in the group of authors
	own	–skills to use automated technological preparation of production systems in the group of authors
<p>PC-16</p> <p>willingness to negotiate with developers and suppliers of process equipment, evaluate the results of the design biotech companies at the design stage</p>	Know	–the main methods of negotiation, negotiation protocols, and form guidelines for the evaluation of the results of biotechnology companies at the design stage
	able to	–to negotiate with developers and suppliers of process equipment, evaluate the results of the design biotech companies at the design stage
	own	–skills and protocols to negotiate with developers and suppliers of process equipment, assessment of biotech companies of the results at the design stage
<p>PC-18</p> <p>willingness to participate in research biotechnological process for experienced and pilot plant</p>	Know	<p>–the theoretical basis of the technical structural design;</p> <p>–Theoretical basics of the art facilities projects (equipment, machinery, devices, aggregates);</p> <p>–operation of the basic types of scientific equipment used in molecular biological experiments</p>

	able to	<ul style="list-style-type: none"> –to analyze the performance of the process for compliance with the original scientific research; –plan and carry out studies on the biotechnological process and experienced pilot plant
	own	<ul style="list-style-type: none"> –skills for the development of new types of devices / equipment, –basic skills of service and careful attitude to scientific equipment –methods of analysis parameters matching process on the original scientific research
PC-19 willingness to participate in the development of design and working of technical documentation	Know	–regulatory requirements for the design of biotechnological production
	able to	–to develop normative and technical documentation on the results of the introduction of technological processes and control systems of advanced technologies biotechnological production
	own	<ul style="list-style-type: none"> –main types of normative and technical documentation is issued as a result of the introduction of technological processes and control systems of advanced production technology of biotechnology products; –regulations specifying the requirements for the design of enterprises for the production of biotechnology products; –The principle of the development of design and working of technical documentation

For the formation of the above competencies in the discipline "Fundamentals of biotechnological production", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
" Electrical Engineering and Electronics "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Work Program "Far Eastern Federal University" academic discipline B1.B.07.03 "Electrical Engineering and Electronics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours), laboratory work (36 hours), independent work (90 hours, including 63 hours in preparation for the exam) exam. Subject is implemented on 3 course in 5 semester.

The purpose of the discipline is the development and acquisition of knowledge and skills:

–receive theoretical training in the field of electrical engineering and electronics,

–to acquire practical skills in assembly and calculation of electric circuits, reading diagrams, familiarity with the principles of instrumentation and electrical codes;

–develop engineering thinking needed to study specific subjects related to the operation of electrical and electronic equipment;

–independently acquire and use to practice new knowledge and skills, to broaden and deepen their scientific worldview;

–find creative solutions to professional problems, to be able to accept non-standard solutions;

–professionally operate the modern equipment;

–draw up, present and report results;

–to use current and future computer and information technology;

–solving engineering and economic challenges using the means of application software.

Tasks:

1) learn to set priorities in the production of biotechnological products;

2) teach to justify the adoption of specific technical solutions in the development of new processes;

3) choose the technical means and technologies, taking into account the environmental consequences of their use.

For successful study of discipline "Electrical engineering and electronics" in students the following preliminary competences should be formed:

–methodologically correct to make measurements in different modes of power consumption and operation of energy-consuming equipment for various purposes;

–have the skills to work with devices with different operating principle and purpose, carrying out instrumental examination of objects that occur in the process;

–the results of instrumental measurements to be able to diagnose and predict the technical condition of the electrical devices.

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

Code and the wording of competence	Stages of formation of competence	
GC 5 the ability to use modern methods and technologies (including information) in professional activity	Know	–modern methods and technology (including information)
	able to	–the use of modern methods and technologies in professional activity
	own	–Modern methods and technologies
GPC 2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the basic laws of natural sciences, mathematical analysis and simulation
	able to	–apply the laws of the natural sciences, mathematical analysis and simulation
	own	–skills to use scientific knowledge, as well as mathematical methods in their professional activity
UIC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the	Know	–modern physical picture of the world, spatio-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena;
	able to	–to understand the essence of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; to understand the essence of physics and the laws of electricity, can use them

surrounding world and natural phenomena	own	–complex knowledge about the laws of physics and the laws of space-time, the structure of matter to understand the surrounding world and the phenomena of nature and knows their applications
GPC-7 ability to find and evaluate new technology solutions to implement the results of biotechnology research and development equipment	Know	–the basic concepts and problems of methodology of studying electrical engineering and electronics, the theoretical foundations of the laws of physics and electrical engineering; norm calculation and electricity consumption for appliances, ways of assessing the effectiveness of power consumption
	able to	–use technical information on the electrical circuits to read and justify the adoption of specific technical solutions in the development of new technological processes
	own	–Principles and methods for finding and evaluating the effectiveness of operation of electrical equipment for technological processes
PC-15 the ability to design processes with the use of automated systems	Know	Basis of technological calculations for the design of new or modernization of existing facilities and production sites of production of biotechnology products; –methods of carrying out calculations for the design of biotechnological production, production lines, workshops, individual sections of enterprises using computer-aided design systems and software, information technology when creating projects newly built and reconstruction of existing enterprises
	able to	–carry out the calculation and design of the individual process steps using the automated preparation process production systems
	own	–skills of calculations for the design of production of biotechnological products, production lines, workshops, individual sections of enterprises using computer-aided design systems and software, information technology when creating projects newly built and reconstruction of existing enterprises

For the formation of the above competencies in the discipline "Electrical engineering and electronics", the following methods of active / interactive learning: problem lectures, polemical small groups, discussion of written essays, simulation game.

Course syllabus
" Processes and Devices of Biotechnology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.07.04 " Processes and Devices of Biotechnology" made up for by the educational program "Molecular Biotechnology" 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 ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (18 hours), laboratory work (18 hours) and practical classes (36 hours) the implementation of a course project, independent work (90 hours, including 45 hours in preparation for the exam). Subject is implemented on 3 course of 6 semester.

Subject "Processes and apparatuses Biotechnology" relates to other disciplines "Physics", "Fundamentals of Organic Chemistry and the total", "Industrial Microbiology and Biotechnology".

a view to studying the discipline is mastering the basics of the theory of various biotechnological processes, principles, devices and methods of designing devices and machines used for the implementation of these processes in terms of actual production with maximum efficiency.

Tasks

- 1) study the physicochemical nature of the major biotechnological processes;
- 2) the ability to design, build and operate biotechnological equipment with maximum efficiency;
- 3) the use of energy-saving technologies;
- 4) introduction of results of scientific research.

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

Code and the wording of competence	Stages of formation of competence
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GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	<ul style="list-style-type: none"> –modern methods and technology (including information) the development of new areas of industrial biotechnology; –the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies of industrial biotechnology; –How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> –the use of modern methods and technologies (including information) in the industrial and molecular biotechnology; –use the software for professional applications
	own	<ul style="list-style-type: none"> –Modern methods and technologies (including information) in biotechnological processes; –basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the basic laws of natural sciences, mathematical analysis and simulation
	able to	–apply the laws of the natural sciences, mathematical analysis and simulation
	own	–skills to use scientific knowledge, as well as mathematical methods in their professional activity
GPC 3 capacity use knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–modern physical picture of the world, spatio-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
	able to	–to understand the essence of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena; to understand the essence of physics and the laws of electricity, can use them
	own	–complex knowledge about the laws of physics and the laws of space-time, the structure of matter to understand the surrounding world and the phenomena of nature and knows their applications

GPC-7 ability to find and evaluate new technology solutions to implement the results of biotechnology research and development	Know	<ul style="list-style-type: none"> –the basic concepts and problems of methodology for studying processes and biotechnology devices, the theoretical basis of the laws of physics, heating engineering and microbiology; –specific methods for estimating properties of substrates, morphological and physiological features of the cultured microorganisms, culture methods (aseptically or without observing aseptic conditions in batch and continuous conditions), the physicochemical properties of fermentation media
	able to	<ul style="list-style-type: none"> –use technical information on special equipment used in biotechnology and microbiological production; –read hardware-technological schemes and justify the adoption of specific technical solutions in the development of new biotechnological processes
	own	<ul style="list-style-type: none"> –Principles and methods for finding and evaluating equipment during operation biotechnological biotechnological processes
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	Know	<ul style="list-style-type: none"> –hardware registration of biotechnological process functions and specifications bioreactors and design features of the individual types of fermenters; –general theoretical laws of hydro, heat transfer processes, mass transfer processes, membrane processes; – heat and mass transfer between the cell and the culture medium by aerobic culturing
	able to	<ul style="list-style-type: none"> –use reference, the calculated and experimental data on the thermal properties of substances and their changes
	own	<ul style="list-style-type: none"> –skills with reference and technical literature; –measuring means skills basic parameters biotechnological processes
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their	Know	<ul style="list-style-type: none"> –specifications and operating principles of bioreactors and fermentation apparatus for the microbiological synthesis processes; –methods for evaluation of biotechnological processes and machines with the environmental impact of their use;

application		–the organization of resource-saving production enterprises of various types
	able to	–operational plan and ensure the reliability of biotechnological production processes
	own	–methods of rational use of raw materials, energy and other resources of various types
PC-4 capacity ensure compliance with safety regulations, industrial hygiene, fire safety and occupational safety	Know	–safety in the operation of biotechnological equipment, hazards associated with the anthropogenic impact on the biosphere; –safety, industrial hygiene, fire safety and safety in biotechnological production
	able to	–ensure compliance with safety regulations, industrial hygiene, fire safety and safety in biotechnological production
	own	–methodological approaches to the assessment of human impact on the environment; –methods of ensuring safety, industrial hygiene, fire safety and safety in the operation of biotechnological devices

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

- lecture-conference;
- lecture-presentation;
- design methodology;
- test items;
- elements of the research work.

Course syllabus
" Introduction to Biotechnology and Professional Activities"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.08.01 "Introduction to biotechnology and professional activities" is made for the professional educational program on a profile "Molecular Biotechnology" 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 education towards training programs 19.03.01 Biotechnology.

B1.B.08.01 discipline "Introduction to biotechnology and professional activities" is included in the base of the compulsory subjects of the educational program for undergraduate profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology.

The total complexity of the development of the discipline is 3 credits, 108 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (36 hours), independent work of students (54 hours, including the preparation for the exam - 36 hours Subject implemented on 1 course in the 1 semester.

The development of the discipline is carried out in parallel and closely connected with the study disciplines: "General biology and microbiology." Is prior to study subsequent courses "Industrial microbiology and biotechnology", "Protein engineering ", " Fundamentals of Biotechnology "et al.

Assessment of learning outcomes: Exam.

Goal:

the formation and development of general and professional competencies needed for careers in the field of molecular biotechnology for the organization and implementation of cell medical technologies in the field of biomedicine

Tasks:

5) study of biotechnology importance for the development of society, its social impact and the bioeconomy;

6) Learning the basics of molecular biotechnology, the values of molecular biotechnology revolution, the emergence and development of molecular biotechnology;

7) study of terms and definitions in the field of biotechnology, as well as the classification of biotechnology products;

8) Learning the tapami biotechnological process and control the main operating steps of the biotechnological productions;

9) study of scientific and technical information on the development of new trends in biotechnology, including biomedicine and biofarmaceutiki;

10)the study of objects of biotechnology and biotech functions;

11)the study of biological systems that are used in molecular biotechnology.

For successful study course "Introduction to biotechnology and professional activities" in studying the following prior knowledge and skills should be formed:

- willingness to communicate orally and in writing in Russian and foreign languages to meet the challenges of professional activity;

- the basics of biology, biochemical characteristics of the main sub-cellular components, the basic laws of animal and plant reproductive biology;

- understanding of the fundamental principles and levels of biological organization, regulatory mechanisms operating at every level;

- representation of the structure of the gene, mutagenesis, the principles of genetic engineering of population genetics and evolutionary genetics, genetic bases and methods of breeding;

- the effects of human impacts on the biosphere, ecological principles of environmental management

- of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and the phenomena of nature.

As a result of studying this discipline in students formed following general professional / professional competence:

Code and the wording of competence	Stages of formation of competence	
GPC-7 ability to find and evaluate new technology solutions to implement the results of biotechnology research and development	Know	<ul style="list-style-type: none"> –theoretical bases of biotechnology and biotechnological production bases; –problems of development of biotechnological methods in medical biology and biotechnology, priorities to address them; –importance of biotechnology for the development of society, its social impact and the Bioeconomics
	able to	<ul style="list-style-type: none"> –apply scientific and technical information on the development of new trends in biotechnology, including biomedicine and biopharmaceuticals; –work with scientific and technical information, to use the Russian and international experience in

		professional work
	own	<ul style="list-style-type: none"> -complex knowledge and skills in the field of modern goals and objectives of Molecular Biotechnology, main trends and prospects of development; -principles and methods of finding and evaluating new technological solutions, the ability to implement the results of biotechnology research and development
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> -basic principles of regulation of metabolism and the growth rate of microorganisms, the methods of the cultivation of microorganisms, the quantitative characteristics of crop growth, -Equipment for cultivation of microorganisms, deposited microorganisms; -major biotechnological process steps; -techniques, methods and principles for the implementation and management of biotechnological processes; -modern achievements of Biological Sciences and Biomedical Technologies
	able to	-use methods of improving biotechnological process to obtain a high quality finished product;
	own	-capacity for implementation and management of biotechnological processes

For the formation of the above competencies in the discipline "Introduction to biotechnology and professional activity" used methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"General biochemistry "
educational profile of the program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.08.02 "General biochemistry" is written for professional education "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education programs in the profile for the ongoing major professional educational in undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (36 hours) and practical classes (36 hours), laboratory work (36 hours), independent work (72 hours, including 45 hours to prepare for the exam). Subject is implemented on 2 course 3 semester.

Subject "General biochemistry" associated with other disciplines PLEU: "General and Inorganic Chemistry", "Organic Chemistry" and "Bioorganic Chemistry", "Physiology of the basics of anatomy."

Development of discipline "General biochemistry" is necessary for the subsequent study of "Fundamentals of Biotechnology", "Protein Engineering", "Bioorganic Chemistry", "Biomedical cell technology."

a view to development of discipline "General biochemistry" is to familiarize students with current scientific knowledge about the chemical composition, properties and metabolism in living organisms on the meaning of the functional properties of the raw material components for the biotech products.

Tasks:

- 1) get acquainted with the chemical composition of living organisms;
- 2) to study the structure, the structure, properties and biological function of organic compounds that make up living organisms;
- 3) consider the main types of metabolic processes and their relationship;
- 4) to trace the relationship between the structure and properties of organic compounds and their changes during processing and storage of raw materials and finished products.

For successful study of discipline "General biochemistry" in students the following preliminary competences should be formed:

– the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technologies;

– ability to use own methods of quality control of raw, semi-finished and finished products.

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

Code and the wording of competence	Stages of formation of competence	
GC 5 the ability to use modern methods and technologies (including information) in professional activity	Know	–modern methods of determining the chemical composition of raw materials and finished products
	able to	–select appropriate methods of studying the chemical composition of raw materials and finished products
	own	–basic methods for determining the chemical composition of raw materials and finished products
GPC 2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the qualitative composition, quantitative content, properties of basic substances of raw materials and finished products
	able to	–analyze the latest scientific biochemical data with the aim of using them for the design and creation of new biotechnologies
	own	–ways and methods of creating new biotechnologies and on the basis of current knowledge about the chemical composition and properties of substances of different types of raw materials
UIC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–modern ideas about the structure of inorganic and organic nature
	able to	–to use biological and chemical knowledge to understand natural phenomena and processes
	own	–comprehension skills and systematization of knowledge about living matter to understanding of the world and natural phenomena
PC 9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for biochemical studies, as well as the methods and the data processing and analysis tools
	able to	–plan and carry out the necessary research, to carry out processing of the results

	own	–skills of biochemical processing of research, analysis and reporting of the results
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For the formation of the above competencies in the discipline "General biochemistry", the following methods of active / interactive learning: press conference lecture, drawing mind maps, work in small groups, whirlpool.

Course syllabus
"General biology and microbiology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.B.08.03 "General Biology and Microbiology" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education towards preparation 19.03.01 Biotechnology.

The complexity discipline 10 credits (144 hours). Curriculum provides lectures 54 hours, laboratory works 72 hours, 54 hours of practical classes and independent work of students 144 hours of them on the exam preparation 54 hours. Subject is implemented on 1, 2 course in semesters 2,3,4.

Subject included in the basic part of the curriculum and is compulsory for the study.

The educational program of the course is aimed at forming students' knowledge of microbiology system and its importance in the field of molecular biotechnology, securing biotechnological products in the production process, storage and sale.

The course includes the study of the historical development, the formation of the discipline and its development prospects, the modern methods used for classification of microorganisms, the main types of microorganisms, as well as methods of cultivation and identification of microorganisms.

a view to discipline "General Biology and Microbiology" is to introduce the bachelors from the main areas of microbiology - the science of the structure, biology and ecology of the smallest forms of life that are invisible to the naked eye, as well as with the methods and practical significance of microorganisms for the professional activity.

Tasks:

1) classification study, morphology, physiology, ecology and genetics of microorganisms;

2) study of microbial biotechnology products safety performance in accordance with the scientific documentation (ND) of the Russian Federation and the Customs Union.

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

Code and the wording of competence	Stages of formation of competence	
Oak 5 the ability to use modern methods and technologies (including information) in professional activity	Know	–methods of theoretical and experimental research in the field of biotechnology; optimal and rational technological modes of cultivation objects of biotechnology, bioprocess equipment operation; methods of analysis of the properties of raw materials and finished products
	able to	–used in scientific activity scientific basis and practical skills of biology, microbiology, applied biotechnology in relation to the processes and techniques of Molecular Biotechnology
	own	–methods of research using theoretical knowledge and practical skills
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the main directions of research activity
	able to	–implement fence material and research methods
	own	–methods and technologies for the implementation of research activities
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–the scientific basis of the safety of biotech products, the submission of the microbiological safety of raw materials, in relation to the processes and technologies of synthesis of biotech products
	able to	–used in scientific activity scientific basis of the safety of biotech products, to determine the microbiological safety of biotech products
	own	–methods of research using theoretical knowledge and practical skills in the field of determining the microbiological safety of biotech products

For the formation of the above competencies in the discipline "General Biology and Microbiology", the following methods of active / interactive learning: problem lectures, method of Intelligence cards.

Course syllabus
"Scientific design and research methodology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.01.01 "scientific design and research methodology" is written for professional educational program on a profile "Molecular Biotechnology" 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 education towards training programs 19.03.01 Biotechnology

Subject is designed for students 2nd year undergraduate Profile "Molecular Biotechnology". The total complexity of the development of the discipline of 3 transcripts units (108 hours). Curriculum provides lecture (18 h.), Practical exercises (36 h.), Independent work (54 h.), Course project, offset

Subject "scientific design and research methodology" includes: methodological foundations of scientific knowledge of the world, the study of the structure and the basic stages of research works. This course examines the methods of theoretical and practical research in the field of biotechnology, research simulation questions and helping to choose the direction of scientific research is correct. In studying the course, students will understand the system of scientific knowledge, to master the methods of search, storage and analysis of scientific data, will be able to handle, execute and present the results of experimental studies.

Subject B1.V.01.01 "scientific design and research methodology" refers to the process module variable part of compulsory discipline in OS FEFU toward 03/19/01 Biotechnology, Molecular Biotechnology profile. Requirements for the "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements obtained in the course of development of the previous subjects: "Foreign Language", "Russian language and culture of speech", "Logic", "Informatics", " Engineering and computer graphics ", " Introduction to biotechnology and professional activity ", " Biology ", " Philosophy ", " Fundamentals of biotechnological production design. "

– the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);

– readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);

- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);
- the ability to use modern methods and technologies (including information) in a professional activity (GPC5);
- the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research (GPC-2);
- the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena (GPC-3);
- possession of the main methods and techniques of experimental research in their professional field (PC-9);
- willingness to use modern information technologies in their professional field, including database and application packages (PC-12).

A special feature in the design and content of the course is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of case studies ("case study"), the method of "brainstorming"), software and hardware, fund teaching, evaluation and electronic means of discipline.

The aim of the development of the discipline a student's understanding of the system of scientific knowledge, principles and means for its procurement.

Tasks:

- 1) Progressive disclosure of the essence of science, research directions and scientific results, its need for the progressive development of society;
- 2) familiarity with basic theoretical principles, laws, principles, terminology, concepts, processes, methods, technologies, tools, operations of scientific activity;
- 3) the study of methods of planning and organization of scientific research in the field of biotechnology;
- 4) familiarity with the general methodology of scientific design, creativity, the general scheme of the organization of scientific research, the practice of using methods of scientific knowledge in the field of biotechnology;
- 5) scientific study of the search engine, analysis, experimentation, etc .;
- 6) mastery selection skills of scientific research topic selection and the necessary bibliography of publications and information materials on the topic of research;
- 7) study the basic methods of research in biology and biotechnology;
- 8) acquainted with the possibilities of carrying out scientific research in the Far East Federal University;

9) learning standards and regulations on registration of the results of research, preparation of research reports, publications, seminars and conferences;

10) Consideration of procedures in the global networks of information on scientific developments, possibilities of scientific contacts, submission of applications for research grants at various levels;

11) familiarity with the procedures of testing research results, publications on the results of scientific research;

12) study of methods of presentation of scientific materials and the formation of the manuscript research, design course projects;

13) mastering the skills of presentation of research results, including seminars and conferences.

As a result of studying the discipline of students' general cultural form (GC), Professional (PC) and a universal competence (CC) (competency elements):

Code and the wording of competence	Stages of formation of competence	
GCC6 the ability to understand, use, produce and competently express innovative ideas in Russian in discussions, publications, public discussions	Know	–particularly functional-style and genre differentiation Russian scientific language
	able to	–use different language means in different situations of communication in oral and written form, demonstrating knowledge of language norms
	own	–literacy skills and reasoned statement of the thoughts in speech and writing in all situations of communication, writing research papers
PC-8 ability to work with scientific and technical information, to use the Russian and international experience in professional work	Know	–mechanisms and tools necessary for professional applications in the field of production, storage and processing of information
	able to	–solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information
	own	–skills of independent work with educational and scientific literature on the subject of research; –basic terminology and basic conceptual apparatus disciplines related information management means; –solving skills of information management tasks
PC-11 knowledge of methods of experimental design, processing and presentation	Know	–Modern approaches to the design and production of biotechnological individual process steps; –the role and tasks of modeling in the design process of biotech companies

of the results	able to	<ul style="list-style-type: none"> –apply the methodology of technological design to the development of the course project; –develop technology and hardware circuits biotechnological production
	own	<ul style="list-style-type: none"> –experimental modeling techniques; –processing and testing results; –public speaking and participating in the discussion on the protection of the course project
PC-13 ability to participate in the development of technological projects in the group of authors	Know	<ul style="list-style-type: none"> –rules of work in the scientific and educational team; –normative documentation regulating work in a team; –duty employees –team
	able to	<ul style="list-style-type: none"> –organize interaction with other members of the team; –participate in the development of technological projects in the group of authors
	own	<ul style="list-style-type: none"> –skills polite, friendly and tolerant communication; –ability to participate in the development of technological projects in the group of authors
PC-18 willingness to participate in research biotechnological process for experienced and pilot plant	Know	<ul style="list-style-type: none"> –the theoretical basis for the creation of production processes for the biotechnological production of products; –design principles biotechnological products with desired properties; –the scientific basis of modern biotechnology, based on the use of microbial populations, animal and plant cells obtained by breeding and genetic methods; –operation of the basic types of scientific equipment used in molecular biological experiments
	able to	<ul style="list-style-type: none"> –to correctly interpret the data obtained in the scientific equipment; –to analyze the performance of the process for compliance with the original scientific research; –plan and carry out studies on the biotechnological process and experienced pilot plant
	own	<ul style="list-style-type: none"> –skills for the development of new types of devices / equipment, own the basic skills of service and careful attitude to the scientific methods of analysis equipment parameters of the process for compliance with the original scientific research
UC-7 the ability and willingness	Know	<ul style="list-style-type: none"> –the basic principles of the organization of biotechnological production

to use in research activities in the field of biotechnology research new methods subject to the rules on copyright	able to	–applying knowledge about the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling
	own	–methods of extraction, concentration, purification and drying of the various groups of biologically active substances; –methods of evaluation of the technical means and technologies, taking into account the environmental consequences of their application

For the formation of the above competencies in the discipline "scientific design and research methodology" applied methods of active / interactive learning: problem lectures, scientific seminars in the form of conferences; experimental workshops, development of the project (project method).

Course syllabus
"Fundamentals of Biotechnology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.01.02 "Fundamentals of Biotechnology" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs towards preparing 19.03.01 Biotechnology.

The course "Fundamentals of Biotechnology" plays an important role in the formation of future researchers and teachers of scientific outlook and modern biology and chemistry thinking sufficient theoretical basis for the successful assimilation of the students of general and special disciplines. During the course "Fundamentals of Biotechnology" takes place to familiarize students with the contemporary scientific literature, produced by the ability to solve specific professionally oriented tasks.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides 18 hours of lectures, 18 hours of labs, 36 hours of practical classes, 72 hours of independent work of students, among them 27 hours to prepare for the exam.

The aim of the course: to acquaint students with the theoretical basics of biotechnology.

Objectives of the course: the formation of modern ideas about new directions for biotechnology development. The course covers virtually the entire range of issues related to technological processes based on the use of living systems (modified microorganisms, cultures of cells of vegetable and animal tissues, and so on.).

The course "Fundamentals of Biotechnology" in varying degrees, has a direct relationship with almost all the disciplines studied during the whole period of mastering by students of the educational program in the direction of training, 19.03.01 Biotechnology and is a compulsory subject in the preparation of specialists in the field of biotechnology (including molecular biotechnology).

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
<p>GPC5</p> <p>the ability to use modern methods and technologies (including information) in professional activity</p>	Know	<ul style="list-style-type: none"> –modern methods and technology (including information) the development of new trends in industrial biotechnology; –the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in industrial biotechnology; –How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> –the use of modern methods and technologies (including information) in molecular biotechnology; –use the software for professional applications; –use the services and information resources of the Internet in Molecular Biotechnology
	own	<ul style="list-style-type: none"> –Modern methods and technologies (including information) in molecular biotechnology; –basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
<p>GPC-2</p> <p>the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research</p>	Know	<ul style="list-style-type: none"> –basic concepts and laws of natural sciences in professional activities, methods of mathematical analysis and modeling, theoretical and experimental research; –biotechnological aspects used in biotechnology; –objects of biotechnology and biotech functions, principles of cell culture; –the essence of molecular genetics methods; –the steps of isolating the desired products
	able to	<ul style="list-style-type: none"> –conduct experimental research and testing of the specified method, using mathematical processing of experimental data; –to use the language of molecular biotechnology; –choose biological objects
	own	<ul style="list-style-type: none"> –fundamentals of biotechnology, the basic laws of natural science disciplines in biotechnology, by mathematical analysis and simulation, theoretical and experimental studies

GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	<ul style="list-style-type: none"> –the concept of the structure of matter; –main directions and problems of modern concepts of Russian and foreign scientists about the physical world and the structure of matter to understand the surrounding world and natural phenomena
	able to	<ul style="list-style-type: none"> –to distinguish scientific knowledge from unscientific; apply knowledge of physical and chemical laws to describe the natural scientific picture of the world; –give practical assessment of modern physical picture of the world on the basis of certain provisions of the theory of the structure of matter
	own	<ul style="list-style-type: none"> –skills analysis of natural phenomena and processes using the concepts of natural science picture of the world; –ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> –basic principles of regulation of metabolism and the growth rate of microorganisms, the methods of the cultivation of microorganisms, –techniques, methods and principles for the implementation and management of biotechnological processes; –modern achievements of Biological Sciences and Biomedical Technologies
	able to	<ul style="list-style-type: none"> –adjust and improve the biotechnological process to obtain a high quality finished product; –carry out biotechnological processes for production and preparation of biologically active substances and the individual components of microbial cells; –ensure compliance with the rules of industrial hygiene, environmental protection, occupational health and safety; –choose the optimum storage conditions for biological products and evaluate their quality during extended storage
	own	<ul style="list-style-type: none"> –managed cultivation methods of microorganisms; –methods of immobilizing microbial cells;

		<ul style="list-style-type: none"> –technology of obtaining biologically active substances and the individual components of microbial cells; –capacity for implementation and management of biotechnological processes
PC-8 ability to work with scientific and technical information, to use the Russian and international experience in professional work	Know	–mechanisms and tools necessary for professional applications in the field of production, storage and processing of information
	able to	<ul style="list-style-type: none"> –extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	<ul style="list-style-type: none"> –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability of scientific information; –ability to work with scientific and technical information, to use the Russian and international experience in professional work
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	–basic methodological approaches and principles of storage, organization and retrieval of scientific information in computer networks and databases, knows the principles of effective and economical search of data on a particular subject with maximum avoidance information noise,
	able to	–applying knowledge about the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling
	own	–skill-based biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling

For the formation of the above competencies in the discipline "Fundamentals of Biotechnology" apply the methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"medical laboratory diagnostics technologies "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.01.03 "medical laboratory diagnostics technologies" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major professional training in the direction of 19.03.01 Biotechnology.

Subject "Medical Laboratory Diagnostics Technology" included in the base of the disciplines.

The total complexity of the development of the discipline of 43 credits, 108 hours. Curriculum provides lecture (18 hours), practical work (36 hours) and independent work of students (54 hours). Subject is implemented on 3 course in 5 semester.

Subject "medical laboratory diagnostics technology" logically and meaningfully related to such courses as "General and Inorganic Chemistry", "Physiology of the basics of anatomy," "General Biology and Microbiology", "Biochemistry."

goal master the techniques most accurate and rapid diagnosis of normal and pathological cells to perform biotechnology, genetic and other types of research.

Tasks:

- 1) based on laboratory studies of chemical technologies;
- 2) skills acquisition of certain types of research and skill to interpret them;
- 3) study of the international system of units in clinical and diagnostic tests;
- 4) learning and mastering equipment technical principles of laboratory tests;

- 5) familiarization with quality assurance organization of laboratory studies

For successful study of discipline "Medical Laboratory Diagnostics Technology" in students the following preliminary competences should be formed:

GPC-5 ready-to-use basic physical and chemical, mathematical and other natural science concepts and methods in solving professional problems;

GPC-9 willingness to use specialized equipment and medical devices provided for use in the professional field;

PC-11 readiness for the organization and implementation of applied and practical projects and other activities for the study of biochemical and physiological processes and phenomena occurring in a human cell;

PC-12's ability to identify new areas of research and challenges in the development of biochemical and physical and chemical technologies in health care.

As a result of studying this discipline in students formed following general culture (GC), general (GPC), Professional (PC) and specialized professional (CC) competences:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	– modern methods and technology (including information) the development of new directions in medical laboratory diagnostics
	able to	– use modern methods and technology (including information) the development of new directions in medical laboratory diagnostics
	own	– skills to use modern methods and technologies (including information) the development of new directions in medical laboratory diagnostics
PC-8 ability to work with scientific and technical information, the use of the Russian and international experience in professional work	Know	– principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; – mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	– extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; – work with scientific and technical information, to use the Russian and international experience in professional work
	own	– evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; – skills of independent work with educational and scientific literature on the subject of research; – skills of analysis and evaluation of the reliability of scientific information; – ability to work with scientific and technical information, to use the Russian and international experience in professional work

UC-4 the capacity for evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications	Know	–morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	–evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	–principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications
UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body	Know	–biochemical, biophysical and physiological processes and phenomena occurring at the cellular, organ and system levels in the human body
	able to	–carry out applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	–Principles and methods of application and practical projects to study the biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system levels in the human body
UC-7 the ability and willingness to use in research activities in the field of biotechnology research new methods subject to the rules on copyright	Know	–new methods of research in the field of biotechnology, and the possibility of their use in research activities; –rules on copyright
	able to	–apply new methods in biotechnology research
	own	–skills to use in research activities in the field of biotechnology research new methods subject to the rules on copyright
UC-9 knowledge of modern approaches to the design of drugs and diagnostic agents	Know	–Innovative ways of creating drugs based on the data using genomics, proteomics and bioinformatics; –New methods and techniques in the design, production and circulation of drugs; –methods for determining the purity mikroorganizmov- producers, determine the concentration of viable cells and their enzymatic activity
	able to	–conduct research on the improvement of biotechnological processes; –use new methods and techniques in the field of drug design and diagnostic products
	own	–new techniques and methods in the field of designing

		<p>drugs and diagnostic agents;</p> <ul style="list-style-type: none"> –physico-chemical, microbiological and biochemical methods –analysis to confirm producing purity authentication medicaments detection and quantification of the impurities; –the ability to participate in research; –skills introduction of new methods and techniques in designing medicaments and diagnostic preparations
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For the formation of the above competencies in the discipline "Medical Laboratory Diagnostics Technology", the following methods of active teaching: lecture, discussion, round table, brainstorming.

Course syllabus
"Biomedical cell technologies"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.01.04 "Biomedical cell technology" made up for "Far Eastern Federal University," the professional education on the profile of the program "Molecular Biotechnology" in accordance with the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (18 hours), laboratory exercises (18 hours) and practical classes (36 hours), an independent student work (108 hours, including exam preparation 36 hours). Subject is implemented on 3 course in 5 semester.

Subject "Biomedical cell technology" based on knowledge of such courses as "Molecular and Cell Biology", "Physiology of the basics of anatomy" and interconnected with such disciplines as "General Genetics" and "Medical Genetics", "Bioengineering", "Molecular Pharmacology".

Assessment of learning outcomes: Exam.

Goals:

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) study of the theoretical foundations 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) mastery of basic cell culture techniques, work 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) 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 the use of cultured cells for the development of 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 in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	– modern methods and technology (including information) the development of new directions in medical laboratory diagnostics
	able to	–use modern methods and technology (including information) the development of new directions in medical laboratory diagnostics
	own	–skills to use modern methods and technologies (including information) the development of new directions in medical laboratory diagnostics
PC-8 ability to work with scientific and technical information, the use of the Russian and international experience in professional work	Know	–principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	–extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	–evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability of scientific information; –ability to work with scientific and technical information, to use the Russian and international

		experience in professional work
UC-1 the ability to apply knowledge of the principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life	Know	–basics of cellular organization of biological, biophysical and biochemical principles, membrane processes, molecular mechanisms of life
	able to	–apply knowledge of the principles fundamentals of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life
	own	–Molecular genetics techniques in describing operation of organisms; –proficiency in the use of knowledge bases of principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life; –basics of organization and development of experimental research of molecular genetic objects
UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body	Know	–biochemical, biophysical and physiological processes and phenomena occurring at the cellular, organ and system levels in the human body
	able to	–carry out applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	–Principles and methods of application and practical projects to study the biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system levels in the human body
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	–basics of biotechnology and biomedical industries, microbiological synthesis, biocatalysis, gene engineering, nanobiotechnology, molecular modeling
	able to	–apply knowledge about the basics of biotechnology and biomedical industries, microbiological synthesis, biocatalysis, gene engineering, nanobiotechnology, molecular modeling
	own	–fundamentals of biotechnology and biomedical industries, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling

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".

Course syllabus
"Genetic Engineering"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (36 hours), laboratory exercises (18 hours) and practical classes (54 hours), an independent student work (72 hours, including exam preparation 36 hours). Subject is implemented on 3 course of 6 semester.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GPC-7 ability to find and evaluate new technology solutions to implement the results of biotechnology research and development	Know	<ul style="list-style-type: none"> –theoretical bases of biotechnology and biotechnological production bases; –new and promising methods in the field of biotechnology; –Principles controlling individual operating stages biotechnological productions; –principles refinement and development of technological processes in preparation for the production of new products; –importance of biotechnology for the development of society, its social impact and the bioeconomics;
	able to	<ul style="list-style-type: none"> –find and evaluate new technology solutions to implement the results of biotechnology research and development; –work with scientific and technical information, to use the Russian and international experience in the profession; –develop processes in preparation for the production of new products; –develop and implement new technological and methodological solutions; –collect and prepare input data for the selection and justification of scientific, technical and organizational decisions based on economic analysis
	own	–complex knowledge and skills in the field of modern

		<p>goals and objectives of Molecular Biotechnology, main trends and prospects of development;</p> <ul style="list-style-type: none"> –methods of collecting and preparing basic data for selection and study of scientific and technical and organizational decisions based on economic analysis; –principles and methods of finding and evaluating new technological solutions, the ability to implement the results of biotechnology research and development
<p>PC-8 ability to work with scientific and technical information, the use of the Russian and international experience in professional work</p>	Know	<ul style="list-style-type: none"> –principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	<ul style="list-style-type: none"> –extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	<ul style="list-style-type: none"> –evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability of scientific information; –ability to work with scientific and technical information, to use the Russian and international experience in professional work
<p>UC-4 the capacity for evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications</p>	Know	<ul style="list-style-type: none"> –morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	<ul style="list-style-type: none"> –evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	<ul style="list-style-type: none"> –principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications
<p>UC-6 the ability to use</p>	Know	<ul style="list-style-type: none"> –basics of biotechnology and biomedical industries, microbiological synthesis, biocatalysis, gene

knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling		engineering, nanobiotechnology, molecular modeling
	able to	–apply knowledge about the basics of biotechnology and biomedical industries, microbiological synthesis, –biocatalysis, gene engineering, nanobiotechnology, molecular modeling
	own	–fundamentals of biotechnology and biomedical industries, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling

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

- seminars in the form of "round tables";

**Course syllabus
"Bioengineering"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology**

Course syllabus B1.V.01.06 "Bioengineering" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline of transcripts 5 units to 180 hours. Curriculum provides lectures (36 hours) and practical classes (36 hours), independent work (108 hours, including 36 hours in preparation for the exam). Subject is implemented on 4 course 7 semester.

Subject "Bioengineering" is an important discipline for students majoring in "Molecular Biotechnology". It is designed to familiarize students with the basic methods and principles of one of the most important fields of activity for a given specialty.

Bioengineering is an important and most promising direction of development of modern technologies. Understanding of the fundamental principles of the functioning of living systems, as well as the main and basic techniques of bioengineering plays a key role in the preparation of the future-biotechnologists.

goal development of "Bioengineering" of the discipline is to acquaint the student with the main achievements in the field of bioengineering, used to describe the spectrum of modern technologies and indicate the prospects for the development of this field of knowledge and practical skills.

Tasks:

- 1) familiarize students with the principles of bionics - biomimetics, as the sphere of engineering, guided by a structure of living systems;
- 2) to teach students the basic methods of genetic engineering as the most relevant and advanced bioengineering;
- 3) familiarize students with the technologies of cell and tissue transplant technology and the basics;
- 4) provide a basis bioinformatic approach to modern biomedical sciences;

5) to introduce the basic principles of the development of scientific and industrial equipment used in the biomedical industry and research.

The contents of this discipline covers the range of basic experimental methods that are widely used in modern bioengineering and biotechnology, such as tools of bioinformatics and molecular biology, as well as outlines the range of perspectives and directions of development of these areas.

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	
<p>GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research</p>	Know	–the essence of genetic information and its implementation mechanisms and playback; mechanisms of regulation of gene activity; Know the basic principles
	able to	–effectively applied natural science approach in modern medical and biological activities; able at a basic level to model biological processes in the experimental activities
	own	–the general methodology of the natural sciences and biomedical research: has the basic principles of observation, experimental, comparative and analytical approaches; proficiency in the use of standards and norms of scientific experiments.
<p>PC-8 ability to work with scientific and technical information, the use of Russian and international experience in professional work</p>	Know	–principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	–extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	–evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability

		<p>of scientific information;</p> <p>–ability to work with scientific and technical information, to use the Russian and international experience in professional work</p>
<p>UC-1 the ability to apply knowledge of the principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life</p>	Know	<p>–encoding principles, the implementation and operation of the genetic information as the basic form of the biological information;</p> <p>–principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life</p>
	able to	–to put into practice the basic techniques of molecular biology and bioengineering
	own	–skills to provide reliable experimental data in the field of molecular biology and bioengineering and their proper analysis methods of bioinformatics resources
<p>CC-3 the ability to apply a basic understanding of the basic laws and modern achievements of genetics and breeding of (genomics, proteomics)</p>	Know	–principles of universality of the genetic code, which make possible the genetic engineering; Know the basic principles of the functioning of the protein-synthesizing apparatus in living cells of all types
	able to	–to experiment by molecular cloning as one of the basic techniques of Bioengineering
	own	–skills molecular cloning in vitro and in vivo - PCR and cloning of biomolecules in cell cultures both prokaryotes and eukaryotes
<p>UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling</p>	Know	–basic methodological approaches and principles of storage, organization and retrieval of scientific information in computer networks and databases, knows the principles of effective and economical search of data on a particular subject with maximum avoidance information noise,
	able to	–use mathematical and computer tools and methods for finding information and analysis of the material, it is able to correctly and efficiently handle arrays of experimental data
	own	–skills to analyze the data obtained with the maximum efficiency, and sufficient to give reliable results

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

Lectures:

1. Lecture visualization
2. Lecture-discussion

Practical lessons:

1. Seminar-debate
2. The detailed conversation
3. Seminar-Press Conference
4. Workshop

**Course syllabus
"Bioinformatics "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology**

Course syllabus B1.V.01.07 "Bioinformatics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the branch of undergraduate program 03.19.01 Biotechnology.

The total complexity of the development of the discipline is an Official 4 units, 108 hours. Curriculum provided lectures (18 hours), practical studies (36 hours), independent work (90 hours). Subject is implemented on 3 course of 6 semester.

Subject logically and meaningfully related to such courses as "General Biology and Microbiology", "Bioengineering" "Biochemistry ", " General Genetics "and" Medical Genetics. "

The purpose of the development of the discipline "Bioinformatics" is to teach the student to apply the methods based on modern information technology to solve problems arising in the practice of medicine and biomedical research.

Tasks:

- to acquaint the student with the current state of science and bioinformatics as a label it is urgent tasks, the main achievements and prospects to date;
- explain the basic principles of storage and retrieval of scientific information;
- teach the student to use information resources and bioinformatics approaches to meet the challenges of medical practice, biomedical research, molecular biology, evolutionary and medical genetics.

"Bioinformatics" is an important discipline for the training of students direction "Medical Biotechnology". It is designed to expand the methodological arsenal of student and teach him how to use the modern tools that have emerged due to the introduction of information technology in modern biology and medicine. Due to the rapid development of methods for collecting, storing and automatic processing of information about biomolecular systems, the ability to apply these

methods is necessary for the effective conduct of biochemical and medical research.

For successful study "Bioinformatics" discipline among students 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.

to the basic knowledge and skills requirements of the student, necessary during the development of this discipline, consistent knowledge gained students in courses "General Biology" "General Biology and Microbiology", "Bioengineering" "Biochemistry ", " Genetics ", mastered earlier.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technology	Know	<ul style="list-style-type: none"> – ROI bioinformatics, basic biochemical, genetic and biomedical problems solved bioinformatics approaches; – Search the foundations of the theory of information; – the basic principles of the structure and dynamics of biomolecules; – fundamentals of the genetic variation of organisms;
	able to	<ul style="list-style-type: none"> – apply basic knowledge of information retrieval theory to extract scientific information from computer networks and specialized databases; – apply knowledge of basic principles of the structure and dynamics of biomolecules and the fundamentals of the genetic variation of organisms in the professional scientific research and medical practice; – apply the approaches of bioinformatics sequence and structural bioinformatics solutions for general and specific problems of biochemistry,

		genetics, and various areas of biomedicine;
	own	<ul style="list-style-type: none"> – approaches for efficient retrieval of information in computer networks and specialized databases, including, for biochemical and biomedical topics; – approaches to the primary analysis of the experimental data on biological molecules;
GPC-5 possession of basic methods, methods and means receiving, storing and processing information, computer skills as an information management tool	Know	– Some approaches to the promotion and presentation of the results of medical and biochemical research in the popular and scientific and popular form;
	able to	– write and publish scientific and popular mini-articles
	own	– skills of scientific data analysis and processing and presenting them to the scientific and popular form, such as scientific and popular articles
PC-12 willingness to use modern information technologies in their professional field, including database and application packages	Know	– Effective methods of searching and retrieving scientific data in computer networks;
	able to	<ul style="list-style-type: none"> – analyze, organize and interpret the biochemical, genetic data and biomedical research, contained in scientific and popular sources; – analyze, organize and interpret the biochemical, genetic data and biomedical research, contained in scientific and popular sources;
	own	– skills of scientific data analysis and processing and presenting them to the scientific and popular form, such as scientific and popular articles
CC-3 the ability to apply a basic understanding of the basic laws and modern achievements of genetics and breeding of genomics, proteomics	Know	<ul style="list-style-type: none"> – basic methodological approaches and the general principles of scientific data storage and retrieval in computer networks; – efficient and economical ways of searching data of interest for a given category of information with noise avoidance; – the largest database of scientific literature and citation, access methods and principles of work in them;
	able to	<ul style="list-style-type: none"> – to conduct an effective search for scientific medical and biochemical information; – work with large databases of scientific literature and citation; – create a personal database of scientific articles;

	own	<ul style="list-style-type: none"> – Effective methods of searching and retrieving scientific data in computer networks; – approaches to the systematization of scientific information and compilation of personal data bases of scientific information;
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	<ul style="list-style-type: none"> – Some approaches to the promotion and presentation of the results of medical and biochemical research in the popular and scientific and popular form;
	able to	<ul style="list-style-type: none"> – analyze, organize and interpret the biochemical, genetic data and biomedical research, contained in scientific and popular sources; – write and publish scientific and popular mini-articles
	own	<ul style="list-style-type: none"> – skills of scientific data analysis and processing and presenting them to the scientific and popular form, such as scientific and popular articles

For the formation of the above competencies within the framework of "Bioinformatics" discipline, the following methods of active / interactive learning: lecture-visualization (2 hrs.), Round Table (6:00.).

Course syllabus
"Protein engineering "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.01.08 "Protein engineering" is written for professional educational program on a profile "Molecular Biotechnology" 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 programs towards preparing 19.03.01 Biotechnology.

Subject B1.V.01.08 "Protein engineering" is included in the base of the compulsory disciplines cycle of basic educational program of bachelor direction 3/19/01 educational program "Molecular Biotechnology".

The total complexity of the development of the discipline of 4 credit units (144 academic hours). Curriculum provides lectures (36 hours) and practical classes (seminars) (36 hours), independent work of students (72 hours, including exam preparation - 36 hours). Subject is implemented on 4 course 7 semester.

The development of the discipline is carried out in parallel and closely connected with the study disciplines: "General and Inorganic Chemistry", "Organic Chemistry", "Bioorganic Chemistry", "biochemistry", "General Biology and Microbiology", "Fundamentals of Biotechnology", and others.

a view to mastery of the discipline of students' knowledge of scientific and practical bases of technology for production and use of biological and protein catalysts in technology and industrial production.

Tasks:

1) broaden and deepen the understanding of the scientific basis and enzyme production processes, the catalysts of the raw material of plant, animal and microbial origin;

2) study of scientific basis for the use of enzyme catalysts for the creation of new biotech industries, new methods for diagnosis and therapy, organic synthesis, etc., as well as the solution of fundamental problems of enzymology using immobilized enzymes.

For successful study of discipline "Protein engineering" in students the following preliminary competences should be formed:

PC - 9 possession of the main methods and techniques of experimental research in their professional field;

PC - 10 standard and the ability to conduct certification testing of raw materials, finished products and production processes.

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

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–modern scientific and practical information technology in the field of biotechnological production
	able to	–the use of modern methods and information technologies in the field of biotechnological production
	own	–proficiency in the use of modern research and production methods and information technologies in the field of molecular biotechnology
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–domestic and foreign achievements in science, technology and natural science fields, methods of mathematical analysis and modeling, theoretical and experimental research
	able to	–work with scientific and technical information, to use domestic and foreign experience in the field of natural sciences and molecular biotechnology to apply the methods of mathematical analysis and modeling, theoretical and experimental research
	own	–proficiency in the use of scientific-Technical and natural science methods, the use of methods of mathematical analysis and modeling, theoretical and experimental research
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–domestic and international developments in the field of natural science, physical and chemical aspects of the world picture, space-temporal patterns, the structure of matter
	able to	–use in biotechnology knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter
	own	–skills to use information about the modern physical picture of the world, the space-temporal patterns, the structure of matter

PC-17 the ability to develop the basic stages of biotechnological process	Know	<ul style="list-style-type: none"> –features of experimental design, –the main stages of biotechnological production, conducting research activities processing and presentation of the results
	able to	–design an experiment, process, organize, and present the results
	own	–experimental design technique, processing and presentation of the results; basic methods and techniques of experimental research in molecular biotechnology
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	<ul style="list-style-type: none"> –the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms; –methods of hardware design and manufacturing technology using specialized biologics microbiological synthesis, biocatalysis, Genetic Engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; –the basic requirements to microorganisms - producers.
	able to	–apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	<ul style="list-style-type: none"> –modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; - methods of independent research and analysis of information in the field of industrial microbiology and biotechnology; –Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work

For the formation of the above competencies in the "Protein engineering" discipline, the following methods of active / interactive learning: problem lectures; lecture - conference; presentation of lectures; design methodology; test items; elements of research work; methods of IT - the use of computers for access to Internet resources, the use of training programs in order to expand the information field, increasing the speed of information processing and transmission, providing

the convenience of conversion and structuring of information to transform it into knowledge (used in the classroom in the form of electronic presentations, lectures, and etc.). Problem-based learning - encouraging students to independent "production" of knowledge required to solve a particular problem. Anticipatory self-study - the study of the students of the new material before its presentation to the teacher lectures and other classroom. .

Course syllabus
"Biostatistics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Subject B1.V.01.09 "Biostatistics" is a discipline of choice module private biotechnology undergraduate educational program on the profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology.

Course syllabus B1.V.01.09 "Biostatistics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours) and practical classes (36 hours), independent work of students (90 hours, including exam preparation 36 hours). Subject is implemented on 4 course 8 semester.

discipline "Biostatistics" Is closely related to previously conducted disciplines: " Logic ", " Higher Mathematics ", " Informatics ", " Introduction to biotechnology and professional activity ", " Mathematical Modeling ", " scientific design and research methodology. "

Assessment of learning outcomes: Exam.

Contents cover a range of issues related to the probabilistic nature of the medicine that makes clear the need for a good knowledge of relevant methods for solving problems related to the heterogeneity and uncertainty. In medicine and healthcare are often used, consciously or unconsciously, a variety of statistical concepts in making on issues such as health assessment solutions, its prognosis, choice of strategy and tactics of prevention and treatment, assessment of long-term results and survival.

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.

Goal: formation and development of culture in general, general, professional and unique competencies required for the collection, processing and analysis of

statistical data received in the workplace and the different stages of the research in the professional activity.

Tasks:

- 1) form a system of knowledge on the statistical processing of biomedical research data;
- 2) show the possibilities of use of multivariate statistical methods for information processing and data analysis of experimental data;
- 3) to acquaint with the methods of systematization experimental material in the interpretation of scientific facts;
- 4) use specialized software designed for statistical data analysis.

For successful study "Biostatistics" discipline students following prior knowledge and skills should be formed:

- the ability to quickly learn new subject areas, identify contradictions, problems and develop alternatives to address them
- the ability to abstract thinking, analysis, synthesis
- ability and willingness of the preparation and use of scientific, industrial, design, organization and management and regulatory documentation
- ability and willingness to use information technology
- ability and willingness of the organization and implementation of applied and practical projects and other activities on the study and modeling of social, economic, epidemiological, and other conditions that affect the health and quality of life.

As a result of studying this discipline in students formed following general culture, general, professional, unique competences:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	– modern methods and technology (including information) statistical analysis;
	able to	– the use of modern methods and technologies (including information) in the statistical analysis
	own	– Modern methods and technologies (including information) in the statistical analysis
GPC-1 the ability to search, store, process and analyze information from various sources and databases, to	Know	– Search methods, storage, processing and analysis of information from various sources and databases
	able to	– use of computer and network technology for searching, storing, processing and analyzing information

represent it in the desired format using the information, computer and network technology	own	– methods of presenting data in the required format professional field of the use of information, computer and network technologies
GPC-5 possession of basic methods, methods and means receiving, storing and processing information, computer skills as an information management tool	Know	–basic methods, ways and means of receiving, storing, processing information
	able to	–receive, store, and process information for statistical analysis
	own	–use computers and software as a means of working with information
PC-12 willingness to use modern information technologies in their professional field, including database and application packages	Know	–methods of use of information and communication technologies in the statistical analysis of the data
	able to	–use the software for statistical analysis of professional applications
	own	–skills to work with packages of statistical data processing programs
UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body	Know	–methodology and stages of statistical analysis of data related to the professional activity, including the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	able to	–use the services and information resources of the Internet, as well as specialized software packages in the solving of statistical analysis of the data related to the professional activity, including biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	–methods of statistical processing of biomedical information for various types of professional applications

For the formation of the above competencies in the "Biostatistics" discipline used methods of active / interactive learning (lecture, discussion, practical exercises, project work), Task Kits for written tests and questions to the colloquium

Course syllabus
"Physiology of the basics of anatomy "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Subject B1.V.02.01 "Physiology of the basics of anatomy" is designed for students in the profile "Molecular Biotechnology" 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 ongoing basic professional educational programs in the branch of undergraduate program 03.19.01 Biotechnology.

Total labor discipline is 4 ZE, 144 hours. Curriculum provided lectures (18 hours), laboratory studies (54 hours), independent student's work (72 hours, including 36 to prepare for the exam). Subject is implemented on 1 course in 2 semesters. The study of discipline is based on knowledge, acquired as a result of the development of these disciplines PLO "General Biology".

goal:

to form students' systematic knowledge about holistic living organism and its individual parts, the basic laws of functioning and mechanisms of their regulation in interaction with each other and with environmental factors, on the physiological basis of clinical and physiological research methods used in functional diagnosis and the study of integrative activities person.

Tasks:

1) the formation of students' skills in the analysis of the whole organism functions from the perspective of integrated physiology, analytical methodology and foundations of medicine;

2) forming the students systematic approach in understanding the physiological mechanisms underlying the interaction with environmental factors and the implementation of adaptive strategies of the human body to maintain the normal functioning position with the concept of functional systems;

3) students study methods and the principles of research of a condition of regulatory and homeostatic systems in laboratory practice and their application in clinical practice;

4) Students study the role of higher nervous activity in the regulation of physiological functions and human-based management backup capabilities of the body in health and disease;

5) to familiarize students with the basic principles of modeling of physiological processes and create computer models to study and focused management functions of the body;

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC), unique (CC) competences:

Code and the wording of competence	stages of formation	
PC-8 ability to work with scientific and technical information, the use of Russian and international experience in professional work	Know	–principles and characteristics of the organization and the accumulation of scientific information; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of information
	able to	–biotechnology professional to solve the problem based on the analysis of specific pathophysiological data on pathological processes, states, reactions and diseases. –extract scientific information from relevant sources; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	–medical and anatomical conceptual apparatus; –skills of analysis and evaluation of the reliability of scientific information; –evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills
UC-1 the ability to apply knowledge of the principles of cellular organization of biological objects, biophysical and biochemical principles, membrane processes and molecular mechanisms of life	Know	–operation patterns of individual organs and systems in the normal conditions of change occurring in the organism during growth and aging, particularly age-related physiological organism basics of cellular organization of biological, biophysical and biochemical principles, membrane processes; –molecular mechanisms of life
	able to	–use basic methods of evaluation of the functional state of the human body, to explain the nature of the physiological changes in the adaptive activities to changing environmental conditions; –apply knowledge of the principles fundamentals of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life

	own	<ul style="list-style-type: none"> –medical and physiological conceptual apparatus, skills assessment of physiological parameters of functional systems and organs; –Molecular genetics techniques in describing operation of organisms; –proficiency in the use of knowledge bases of principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life
MC-2 ability and willingness to understand and analyze the biochemical, physicochemical, molecular biological mechanisms of development of pathological processes in cells and tissues of the human body	Know	–biochemical, physical and chemical, molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body
	able to	–analyze the biochemical, physical, chemical, molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body
	own	–skills analysis of biochemical, physical-chemical, molecular biological mechanisms of development of pathological processes in cells and tissues of the human body
UC-4 the capacity for evaluation of morphological and functional, physiological and pathological states processes in the human body for professional applications	Know	–morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	–evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	–principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications
UC-5 the ability and willingness to implement the application and practical projects Study of biochemical, biophysical and physiological processes and phenomena occurring at the cellular, organ and system levels in the human body	Know	–biochemical, biophysical and physiological processes and phenomena occurring at the cellular, organ and system levels in the human body
	able to	–carry out applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	–Principles and methods of application and practical projects to study the biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system

		levels in the human body
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For the formation of the above competencies in the discipline "Physiology with the basics of anatomy," employ a method of active / interactive learning: seminars in the form of "round tables"; problem method, experimental workshops.

Course syllabus
"General pathology and fundamentals of nosology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Subject B1.V.02.02 "General pathology and fundamentals of nosology" is designed for students in the profile "Molecular Biotechnology" 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 ongoing basic professional educational programs in the undergraduate program 19.03.01 Biotechnology.

Total labor discipline 3 units, 108 hours. Curriculum provides lectures (18 hours) and practical classes (36 hours), independent work (54 hours, including 36 hours in preparation for the exam). Subject is implemented on 2 course 3 semester. The study of discipline is based on knowledge, acquired as a result of the development of the following disciplines PLEU: "General Biology", "Physiology of the basics of anatomy".

The course program is based on the basic knowledge acquired by students:

GPC-2's ability and willingness to use the basic laws of natural sciences in professional activities, the use of methods of mathematical analysis and modeling, theoretical and experimental research.

The aim of the program discipline - formation of students' systematic knowledge about the causes and conditions of occurrence, development and outcome of the mechanisms of pathological processes and disease, needed to perform their professional duties.

The objectives of the course are:

1) acquire knowledge of the theoretical total (standard) morphofunctional patterns of occurrence and development of pathological reactions, processes and states lying in diseases basis (general pathology); nomenclature, etiology, pathogenesis, outcomes, prevention and therapy principles most common human diseases (private pathology);

2) forming ability to use modern methods of assessing violations of basic functional parameters of human activity in various forms of pathology;

3) acquisition abilities experimental work with animals and experimental models for assessing the biological activity of natural and synthetic compounds;

4) consolidation of theoretical knowledge to identify the major mechanisms of pathology for the "impact" and the most effective drug exposure.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	stages of formation	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	– modern methods and technology (including information) the development of new trends in molecular biotechnology, using knowledge of pathological processes;
	able to	– the use of modern methods and technologies (including information) in molecular biotechnology; – use the software for professional applications; use the services and information resources of the Internet in Molecular Biotechnology
	own	– Modern methods and technologies (including information) in molecular biotechnology; – basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
PC-8 ability to work with scientific and technical information, the use of Russian and international experience in professional work	Know	– basic concepts of general nosology; – the causes, mechanisms and basic manifestations of typical violations of organs and physiological systems of the body.
	able to	– extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; – analyze problems of general pathology and critically evaluate advanced theoretical concepts and trends in biology, medicine and molecular biotechnology; – work with scientific and technical information, to use the Russian and international experience in professional work
	own	– evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; – skills of analysis and evaluation of the reliability of scientific information;

		–ability to work with scientific and technical information, to use the Russian and international experience in professional work
MC-2 ability and readiness 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	Know	– biochemical, physical and chemical, molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body
	able to	– analyze the biochemical, physical, chemical, molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body
		– conduct pathophysiological analysis of clinical and laboratory, experimental, other data
	own	– skills biochemical analysis, physico-chemical and molecular biological mechanisms of development of pathological processes in the cells and tissues of the human body
UC-4 the capacity for evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications	Know	– morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	– evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	– principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications

For the formation of the above competencies in the discipline "General pathology and fundamentals of nosology". Apply the methods of active / interactive learning: seminars in the form of "round tables"; problem method, experimental workshops.

Course syllabus
"Molecular and Cell Biology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.OD.2.7 "Molecular and Cell Biology" is written for professional educational program on a profile "Molecular Biotechnology" 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 in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines transcripts is 7 units (252 hours). Curriculum provides lecture (36 hours), laboratory exercises (72 hours) and practical classes (54 hours), independent work (90 hours, including exam preparation 27 hours).

"Molecular and Cellular Biology" discloses a structure and molecular mechanisms of cell activity.

Study of "Molecular and Cellular Biology" is related to other disciplines of the program. Previous undergraduate disciplines: introduction to biotechnology and professional activity, biochemistry, basics of biotechnology; subsequent discipline, learning which is based on the "Cell and Molecular Biology": biomedical cell technology, pharmaceutical biotechnology, medical biotechnology, bioengineering, industrial biotechnology, marine biotechnology, biotechnology aquatic organisms.

The purpose of the development of the discipline"Molecular and Cell Biology" - specialization theoretical training the students' knowledge in the field of cell and molecular biology of the cell - biology section, the subject of which is a cell, the basic unit of living things. A cell is considered as a system comprising a separate cellular structures, their participation in obshchekletochnyh physiological processes way regulation of these processes, as well as studying the basic properties and displays on the molecular level of life.

Tasks:

1) develop students' holistic understanding of the molecular cell level of the organization;

2) obtaining current knowledge about the structure, dynamics and function of molecular cell assemblies, the molecular mechanisms of the development and functioning of cells.

As a result of the course the student has formed the following competencies:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–on how to use modern information technologies and methods in molecular and cellular biology
	able to	–use information technologies, modern methods and high-tech equipment in the field of cell and molecular biology of the cell
	own	–skills of the use of information techniques and technologies in the field of cell and molecular biology of the cell
GPC-2 ability and willingness to use the basic laws of natural sciences in professional activities, the use of methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the main trends of development and the laws of natural sciences in professional activities, methods of mathematical analysis and modeling, theoretical and experimental research; –the essence of molecular and cell biology
	able to	–formulate and use the basic laws of natural sciences in professional activities, –apply methods of mathematical analysis and modeling, theoretical and experimental research
	own	–proficiency in the use of methods of mathematical analysis in the profession; methods of applying natural laws; modeling skills, theoretical and experimental research
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	–plan and carry out the necessary research, to carry out processing of the results
	own	–the skills of the chemical processing of research, analysis and reporting of the results

UC-1 the ability to apply knowledge of the principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life	Know	–basics of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life.
	able to	–apply knowledge of the principles of the foundations of the cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life
	own	–proficiency in the use of knowledge bases of principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life.
UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body	Know	–methods for studying the biochemical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	able to	–set goals, implement the scientific research, the development of an experiment for the study of biochemical and physiological processes and phenomena
	own	–methods for studying the biochemical and physiological processes and phenomena, communication skills and work in a research team
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	–the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms; –methods of hardware design and manufacturing technology using specialized biologicals microbiological synthesis, biocatalysis, Genetic Engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; –the basic requirements to microorganisms - producers.

	able to	–apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	–modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; - methods of independent research and analysis of information in the field of industrial microbiology and biotechnology; –Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work

For the formation of the above competencies in the discipline "Molecular and Cell Biology", the following methods of active / interactive learning: lecture, visualization, lectures, discussions and seminars, a colloquium on the theoretical material.

Course syllabus
"Biochemistry"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.02.04 "Biochemistry" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 5 credits, 180 hours. Curriculum provides lectures (36 hours) and practical classes (36 hours), laboratory work (36 hours), independent work (72 hours, including 36 hours in preparation for the exam). Subject is realized on the 2 course in 4 semester.

Subject "Biochemistry" is connected with other disciplines PLEU: "General and Inorganic Chemistry", "Organic Chemistry" and "Bioorganic Chemistry", "Physiology of the basics of anatomy."

Development of discipline "Biochemistry" is necessary for the subsequent study of "Fundamentals of Biotechnology", "Protein Engineering", "Bioorganic Chemistry", "Biomedical cell technology."

a view to development "Biochemistry" discipline is to familiarize students with current scientific knowledge about the chemical composition, properties and metabolism in living organisms on the meaning of the functional properties of the raw material components for the biotech products.

Tasks:

- 5) get acquainted with the chemical composition of living organisms;
- 6) to study the structure, the structure, properties and biological function of organic compounds that make up living organisms;
- 7) consider the main types of metabolic processes and their relationship;
- 8) to trace the relationship between the structure and properties of organic compounds and their changes during processing and storage of raw materials and finished products.

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

– the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technologies;

– ability to use own methods of quality control of raw, semi-finished and finished products.

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

Code and the wording of competence	Stages of formation of competence	
GC 5 the ability to use modern methods and technologies (including information) in professional activity	Know	–modern methods of determining the chemical composition of raw materials and finished products
	able to	–select appropriate methods of studying the chemical composition of raw materials and finished products
	own	–basic methods for determining the chemical composition of raw materials and finished products
GPC 2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–the qualitative composition, quantitative content, properties of basic substances of raw materials and finished products
	able to	–analyze the latest scientific biochemical data with the aim of using them for the design and creation of new biotechnologies
	own	–ways and methods of creating new biotechnologies and on the basis of current knowledge about the chemical composition and properties of substances of different types of raw materials
UIC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–modern ideas about the structure of inorganic and organic nature
	able to	–to use biological and chemical knowledge to understand natural phenomena and processes
	own	–comprehension skills and systematization of knowledge about living matter to understanding of the world and natural phenomena
PC 9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for biochemical studies, as well as the methods and the data processing and analysis tools

	able to	–plan and carry out the necessary research, to carry out processing of the results
	own	–skills of biochemical processing of research, analysis and reporting of the results
UC-1 the ability to apply knowledge of the principles of cellular organization of biological objects, biophysical and biochemical principles, membrane processes and molecular mechanisms of life	Know	–basics of cellular organization of biological, biophysical and biochemical principles, membrane processes; –molecular mechanisms of life
	able to	–apply knowledge of the principles fundamentals of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life
	own	–Molecular genetics techniques in describing operation of organisms; –proficiency in the use of knowledge bases of principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life; –basics of organization and development of experimental research of molecular genetic objects

For the formation of the above competencies in the "Biochemistry" discipline, the following methods of active / interactive learning: press conference lecture, drawing mind maps, work in small groups, whirlpool.

Course syllabus
"Molecular Pharmacology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.02.05 "Molecular Pharmacology" is written for professional education "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education programs in the profile for the ongoing major professional educational programs towards preparing 19.03.01 Biotechnology.

Subject "Molecular Pharmacology" included in the group of compulsory subjects variable part of the curriculum.

The total complexity of the development of the discipline of 3 units, 108 hours. Curriculum provides lectures (18 hours) and practical classes (54 hours), an independent student work (72 hours, including the preparation for the exam 36 hours). Subject is implemented on 3 course in 5 semester.

The development of the discipline is carried out in parallel and closely connected with the study subjects "Molecular and Cellular Biology", cell Biomedical Technologies ", prior to a subsequent study subjects" Pharmaceutical Biotechnology, "" Medical Biotechnology "et al.

Contents covers the following issues:

- the study of the molecular bases of the pharmacodynamics and pharmacokinetics of drugs;
- the study Molecular Pharmacology of drugs;
- the study enzyme systems which catalyze reactions of xenobiotic detoxification;
- the study factors determining the biological effect of xenobiotic body;
- familiarity with nanopharmacology.

goal program - mastering students main provisions of general pharmacology and pharmacology of individual body systems, the mechanisms of action of drugs, knowledge about the molecular targets for drugs, the development of future specialists of complex thinking, allowing to predict the positive and negative side effects of drugs, and combinations thereof, forming the ability to apply this knowledge in their professional activities.

Tasks:

1) master key information on general pharmacology, mechanisms of drug interactions in biological targets, pharmacokinetics, pharmacodynamics and application of the main groups of drugs;

2) be able to analyze the effect of drugs on the organism level, organ, cells, subcellular structures and molecules;

3) know the basic principles of pharmacological groups of drugs, questions molecular mechanism of their action and safety profile;

4) predict and time prevent the development of adverse reactions of drugs, based on the molecular aspects of drug action.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	<ul style="list-style-type: none"> –modern methods and technology (including information) the development of new trends in the industry –biotechnology; –the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in industrial biotechnology; –How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> –the use of modern methods and technologies (including information) in molecular biotechnology; –use the software for professional applications; –use the services and information resources of the Internet in Molecular Biotechnology
	own	<ul style="list-style-type: none"> –Modern methods and technologies (including information) in molecular biotechnology; –basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and	Know	<ul style="list-style-type: none"> –the concept of the structure of matter; –main directions and problems of modern concepts of Russian and foreign scientists about the physical world and the structure of matter to understand the surrounding world and natural phenomena
	able to	<ul style="list-style-type: none"> –to distinguish scientific knowledge from unscientific; –apply knowledge of physical and chemical laws to

natural phenomena		describe the natural scientific picture of the world; –give practical assessment of modern physical picture of the world on the basis of certain provisions of the theory of the structure of matter
	own	–skills analysis of natural phenomena and processes using the concepts of natural science picture of the world; –ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	–plan and carry out the necessary research, to carry out processing of the results
	own	–the skills of the chemical processing of research, analysis and reporting of the results
UC-4 the capacity for evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications	Know	–morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	–evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	–principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications

For the formation of the above competencies in the "Molecular Pharmacology" discipline, the following methods of active learning: problem lectures, lesson discussions.

Course syllabus
"Biophysics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.02.06 "Biophysics" is written for professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education implemented by the basic professional educational programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of the development of the discipline of 4 ZE, 144 hours. Curriculum provided lectures (18 hours), laboratory studies (18 hours), practical studies (36 hours), independent student's work (72 hours). Subject is implemented on 3 course of 6 semester.

The study biophysics course is based on the whole complex of scientific knowledge of the student, he received in high school, and disciplines previously studied, such as "Higher Mathematics", "General Biology", "Physics", "Organic Chemistry" and "Bioorganic Chemistry", " Biochemistry". Development of discipline "Biophysics" is necessary for the subsequent study of "Medical Laboratory Diagnostics Technology", "Biomedical cell technology."

The purpose of discipline - to acquaint students with modern scientific knowledge in the use of modern biophysical, biochemical, clinical laboratory equipment in the laboratories and departments of medical and scientific organizations, and development of new scientific, diagnostic methods of research during medical diagnostic and research activities.

The tasks of development disciplines:

- 1) students acquire knowledge on the biophysical principles that underlie the functioning of cells, organs and tissues of the human body;
- 2) teaching students the most important methods of biophysical studies, allowing early diagnosis of pathological states at molecular cellular level;
- 3) teaching students skills in modern biophysical research and diagnostic equipment;
- 4) teach students methods of statistical processing of biophysical measurements;

5) students acquire scientific outlook, the ability to maintain an active dialogue on scientific issues, the ability to present the results obtained in the form of written and oral messages.

For successful study course "Biophysics" the students should have the following knowledge and skills generated by previous disciplines of mathematical, natural-science cycle.

Knowledge: modern computer and information and communication technologies and their use for the treatment of medical and biological data; basic laws of physics, physical phenomena and processes; Physico-chemical basis of the functioning of living systems; basic laws of development and functioning of the body on the basis of the structural organization of cells, tissues and organs; the physical basis of the functioning of the device, the purpose and principles of medical equipment.

skills: Apply the necessary mathematical analysis of experimental data, select the appropriate mathematical apparatus for solving and validation solutions; use software system for processing of experimental and clinical data, the study of biochemical processes in the body; quantitatively and qualitatively assess the physiological and pathophysiological indicators of various organs and systems in health and disease; use theoretical and methodological knowledge for the study of the nature and mechanisms of development of pathological processes; use of educational, scientific, popular scientific literature, the Internet for the abstract work of biomedical disciplines.

ownership: Methods for dealing with hardware for electrical, magnetic, optical and spectroscopic measurements; experimental skills to investigate the physiological functions of the body in health and in various diseases.

As a result of studying this discipline in students following professional competences are formed:

Code and the wording of competence	Stages of formation of competence	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	–guidelines for the collection, publication and organization of scientific information; Know criteria of good faith and credibility of scientific information
	able to	–find the necessary reliable scientific information; Know how to extract the desired data from the information networks; able to organize both routine and experimental work in accordance with the standards and norms

	own	–skills to provide reliable scientific and diagnostic data; It has the ability to fairly and adequately represent and store the data
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research	Know	–nature of genetic information and its implementation mechanisms and playback; mechanisms of regulation of gene activity, ontogenesis periodization; Know the basic principles, standards and norms of scientific experiments - integrity, reproducibility, etc.
	able to	–effectively applied natural science approach in modern medical and biological activities; able at a basic level to model biological processes in the experimental activities.
	own	–the general methodology of the natural sciences and biomedical research: has the basic principles of observation, experimental, comparative and analytical approaches
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–the fundamental principles of organization and functioning of living systems in general, and the human body in particular,
	able to	–effectively applied natural science approach in modern medical and biological activities; able at a basic level to model biological processes in the experimental activities.
	own	–understanding of the biological nature of medical problems and ideas about modern methods of biomedical research; –the general methodology of the natural sciences and biomedical research: has the basic principles of observation, experimental, comparative and analytical approaches
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	–principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	–plan and carry out the necessary research, to carry out processing of the results
	own	–the skills of the chemical processing of research, analysis and reporting of the results
PC-18 willingness to participate in	Know	–operation of the basic types of scientific equipment used in molecular biological

research biotechnological process for experienced and pilot plant		experiments
	able to	–to correctly interpret the obtained data on the scientific equipment
	own	–skills for the development of new types of devices / equipment, own the basic skills of service and careful attitude to scientific equipment
UC-1 the ability to apply knowledge of the principles of cellular organization of biological objects, biophysical and biochemical principles, membrane processes and molecular mechanisms of life	Know	–basics of cellular organization of biological, biophysical and biochemical principles, membrane processes; –molecular mechanisms of life
	able to	–apply knowledge of the principles fundamentals of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life
	own	–Molecular genetics techniques in describing operation of organisms; –proficiency in the use of knowledge bases of principles of cellular organization of biological, biophysical and biochemical principles, membrane processes and molecular mechanisms of life; –basics of organization and development of experimental research of molecular genetic objects
MC-2 ability and readiness to understand and analyze the biochemical, physicochemical, molecular biological mechanisms of development of pathological processes in cells and tissues the human body	Know	–basic concepts of general nosology. the role of the causes, conditions, reactivity in the occurrence, development and completion of the (outcome) of the disease.
	able to	–conduct pathophysiologic analysis of clinical and laboratory, experimental, and other data to formulate their opinion on the basis of the most likely causes and mechanisms of development of pathological processes (diseases)
	own	–basic concepts of general nosology. the role of the causes, conditions, reactivity in the occurrence, development and completion of the (outcome) of the disease.
UC-5 the ability and willingness to implement the application and	Know	–the fundamental principles of organization and functioning of living systems in general, and the human body in particular,

practical projects Study of biochemical, biophysical and physiological processes and phenomena occurring	able to	–effectively applied natural science approach in modern medical and biological activities; able at a basic level to model biological processes in the experimental activities.
at the cellular, organ and system levels in the human body	own	–understanding of the biological nature of medical problems and ideas about modern methods of biomedical research; –the general methodology of the natural sciences and biomedical research: has the basic principles of observation, experimental, comparative and analytical approaches

For the formation of the above competencies in the discipline "Biophysics", the following methods of active / interactive learning: lecture, discussion, problem lectures, trainings, discussions, role-playing game.

Course syllabus
"Overallgenetics"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V. 02.07 "General Genetics" composed of professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education for ongoing basic vocational education by field of study 19.03.01 Biotechnology.

Subject "General Genetics" is a group of compulsory subjects variable part of the curriculum of the program "Molecular Biotechnology".

The total complexity of the development of the discipline of 3 units, 108 hours. Curriculum provides lectures (18 hours), laboratory exercises (18 hours) and practical classes (18 hours), an independent student work (54 hours, in t. Ch. 27 hours in preparation for the exam). Subject is implemented on 3 course in 5 semester.

The study of discipline is based on knowledge acquired in the development of these disciplines the PLO: "General Biology", "General pathology and fundamentals of nosology", "Physiology of the basics of anatomy," "Molecular and cellular biology."

The knowledge and skills needed for the development of the discipline "Pharmaceutical Biotechnology", "Quality and safety of biotech products."

Goal - the development of the discipline: training in the use of genetic techniques for scientific research and their role in various areas, to lay the foundations of genetic approaches in dealing with any scientific and medical applications.

Tasks:

1) development of theoretical foundations of genetics, the study of the principles of genetic analysis, introduction to the methods and means of genetic research, development of solutions genetic problems;

2) understanding the nature of human hereditary diseases, their etiology, pathogenesis, the reasons for wide clinical polymorphism etiology of common forms and genetic heterogeneity of clinically similar condition;

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

As a result of studying the discipline the students formed following general professional, occupational and vocational and specialized competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
<p>GPC5 the ability to use modern methods and technologies (including information) in professional activity</p>	Know	<ul style="list-style-type: none"> – modern methods and technology (including information) the development of new trends in industrial biotechnology; – the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in industrial biotechnology; – How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> – the use of modern methods and technologies (including information) in molecular biotechnology; – use the software for professional applications; – use the services and information resources of the Internet in Molecular Biotechnology
	own	<ul style="list-style-type: none"> – Modern methods and technologies (including information) in molecular biotechnology; – basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
<p>GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena</p>	Know	<ul style="list-style-type: none"> – role of genetic information in the life cycle of living organisms;
	able to	<ul style="list-style-type: none"> – explain the role of genetic information in the life cycle of living organisms; – to solve problems in genetics; – to establish the genotype of parents, if you know the genotype of the child, and vice versa; – to find out the effect of genotype on phenotype.
	own	<ul style="list-style-type: none"> – pedigree analysis technique, the method of application of twin, population genetics techniques; – modern methods of solving problems in

		genetics; –skills of interpretation of information received on the genotype and phenotype.
PC-8 ability to work with scientific and technical information, to use the Russian and international experience in professional work	Know	–principles and characteristics of the organization and the accumulation of scientific information
	able to	–extract scientific information from relevant sources
	own	–skills of analysis and evaluation of the reliability of scientific information
CC-3 the ability to apply a basic understanding of the basic laws and modern achievements of genetics and breeding of genomics and proteomics	Know	–role of genetic disorders as the cause of some diseases; –Classification of inherited diseases; –chromosomal syndromes and diseases with hereditary predisposition; methods of diagnosing, treating and correction; –medical prognosis; Possible causes disturbances in the system chromosome and gene mutations.
	able to	–explain the mechanism of the variability of genetic material (gene mutations, chromosomal rearrangements); –to use in their practice the theoretical knowledge and skills in the field of genetics; –to establish the genotype of parents, if you know the genotype of the child, and vice versa - to recognize a situation in which it is shown genetic counseling and recommend parents to this procedure, if necessary; –parents explain the advantages and limitations of prenatal diagnosis; –allocate signs of chromosomal and multifactorial pathologies and recommend parents to apply to the medical and genetic counseling.
	own	–method of genetic analysis; –pedigree analysis technique, the method of application of twin, population genetics techniques; –skills of interpretation of modern methods of molecular genetics.

For the formation of the above competencies in the discipline "General Genetics", the following methods of active / interactive learning: lecture, press conference, discussion, debates, case task.

Course syllabus
"Medical genetics "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V. 02.08 "Medical Genetics" composed of professional educational program on a profile "Molecular Biotechnology" in accordance with the requirements of the educational standard, self-installed "Far Eastern Federal University," a federal state autonomous educational institution of higher education for ongoing basic vocational education by field of study 19.03.01 Biotechnology.

Subject "Medical genetics" is a group of compulsory subjects variable part of the curriculum of the program "Molecular Biotechnology".

The total complexity of the development of the discipline of 4 units, 144 hours. Curriculum provided lectures (18 hours), laboratory studies (18 hours), practical studies (36 hours), independent student's work (72 hours). Subject is implemented on 3 course of 6 semester

The study of discipline is based on knowledge acquired in the development of these disciplines the PLO: "General Biology", "General pathology and fundamentals of nosology", "Physiology of the basics of anatomy," "Molecular and cellular biology."

The knowledge and skills needed for the development of the discipline "Pharmaceutical Biotechnology", "Quality and safety of biotech products."

goal the development of the discipline: training in the use of genetic techniques for scientific research and their role in various areas, to lay the foundations of genetic approaches in dealing with any scientific and medical applications.

Tasks:

4) development of theoretical foundations of genetics, the study of the principles of genetic analysis, introduction to the methods and means of genetic research, development of solutions genetic problems;

5) understanding the nature of human hereditary diseases, their etiology, pathogenesis, the reasons for wide clinical polymorphism etiology of common forms and genetic heterogeneity of clinically similar condition;

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

As a result of studying the discipline the students formed following general professional, occupational and vocational and specialized competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
<p>GPC5 the ability to use modern methods and technologies (including information) in professional activity</p>	Know	<ul style="list-style-type: none"> – modern methods and technology (including information) the development of new trends in industrial biotechnology; – the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in industrial biotechnology; – How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> – the use of modern methods and technologies (including information) in molecular biotechnology; – use the software for professional applications; – use the services and information resources of the Internet in Molecular Biotechnology
	own	<ul style="list-style-type: none"> – Modern methods and technologies (including information) in molecular biotechnology; – basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
<p>PC-9 possession of the main methods and techniques of experimental research in their professional field</p>	Know	<ul style="list-style-type: none"> – principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	<ul style="list-style-type: none"> – plan and carry out the necessary research, to carry out processing of the results
	own	<ul style="list-style-type: none"> – the skills of the chemical processing of research, analysis and reporting of the results
<p>CC-3 the ability to apply a basic understanding of the basic laws and modern</p>	Know	<ul style="list-style-type: none"> – role of genetic disorders as the cause of some diseases; – Classification of inherited diseases;

<p>achievements of genetics and breeding of genomics and proteomics</p>		<ul style="list-style-type: none"> –chromosomal syndromes and diseases with hereditary predisposition; methods of diagnosing, treating and correction; –medical prognosis; Possible causes disturbances in the system chromosome and gene mutations.
	able to	<ul style="list-style-type: none"> –explain the mechanism of the variability of genetic material (gene mutations, chromosomal rearrangements); –to use in their practice the theoretical knowledge and skills in the field of genetics; –to establish the genotype of parents, if you know the genotype of the child, and vice versa - to recognize a situation in which it is shown genetic counseling and recommend parents to this procedure, if necessary; –parents explain the advantages and limitations of prenatal diagnosis; –allocate signs of chromosomal and multifactorial pathologies and recommend parents to apply to the medical and genetic counseling.
	own	<ul style="list-style-type: none"> –method of genetic analysis; –pedigree analysis technique, the method of application of twin, population genetics techniques; –skills of interpretation of modern methods of molecular genetics.
<p>UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body</p>	Know	<ul style="list-style-type: none"> –the physical nature of the phenomena and processes in the body; –structure of the human body in conjunction with the functions of organs and systems; –methods for constructing models of physiological systems at the subcellular, cellular, tissue and system levels of the human body; –methods for solving problems of identification parameters and isolating informative signs on actual clinical and experimental data; –methods for studying the biochemical and physiological processes and phenomena

		that occur at the cellular, organ and system levels in the human body
	able to	<ul style="list-style-type: none"> –apply a model organism known systems for the analysis of physiological processes and conditions. –identify the model parameters from experimental data or the results of clinical studies; –carry out applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	<ul style="list-style-type: none"> –methods for studying the biochemical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body; –methods of application and practical projects to study the biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system levels in the human body

For the formation of the above competencies in the discipline "Medical Genetics", the following methods of active / interactive learning: lecture, press conference, discussion, debates, case task.

Course syllabus
"Pharmaceutical Biotechnology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.01.01 "Pharmaceutical Biotechnology" drawn up for the professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (54 hours), laboratory work (36 hours), independent work of students (108 hours, including the preparation for the exam - 36 hours). Subject is implemented on 4 course 7 semester.

The development of the discipline is carried out in parallel and closely connected with the study disciplines: "General Biology and Microbiology", "Molecular and Cellular Biology", "Industrial microbiology and biotechnology", "Molecular Pharmacology", "Applied Microbiology".

Assessment of learning outcomes: Exam.

Goal:

the formation and development of general and professional competencies needed for careers in the field of biotechnology for obtaining pharmaceutical substances, as well as prophylactic and diagnostic agents biotechnological methods of synthesis and transformation, as well as a combination of biological and chemical methods.

Tasks:

1) study technological modes growth of microorganisms-producers, tissue culture and to produce biomass of plant and animal cells, its components and metabolic products directed biosynthesis of biologically active compounds and other products, a study of their composition and methods of analysis, feasibility evaluation criteria, creating effective compositions biologics and development of methods of their use.

2) study microbiological synthesis processes and apparatus, including physical and chemical kinetics, fluid dynamics, mass and heat transfer in apparatus

for fermentation, a biomass concentration, cell suspensions separation, drying, granulation, extraction, separation, fractionation, purification, storage and control of final desired products.

3) mastering methods and means for the development of new processes based on microbial synthesis, biotransformation, biocatalysis, immunoadsorption, biodegradation, biooxidation and creation biocomposting systems of various waste treatment anthropogenic waste (wastewater, waste gases and al.), the creation of closed flowsheets microbiological production, the latest, taking into account issues of environmental protection.

4) mastery of the methods and means of development of scientific and methodological foundations for the application of the standard of biological systems at the molecular, cellular, tissue and organismal level in scientific research, safety and quality assessment control the use of pharmaceutical, medical, veterinary and perfumery-cosmetic biologics.

5) training students the ability to correctly evaluate compliance with the rules of the biotechnological production of Good Manufacturing Practice (GMP), the environmental safety requirements in relation to bioobjects and target products used in the production.

As a result of studying this discipline in students formed following general professional / professional competence:

Code and the wording of competence	Stages of formation of competence	
GPC-2 the ability and willingness to use the basic laws of natural sciences in professional activities, to apply mathematical techniques	Know	<ul style="list-style-type: none"> –basic concepts, formulas and laws of natural sciences in professional activities, methods of mathematical analysis and modeling, theoretical and experimental research; –biotechnological aspects used in biotechnology; –objects of biotechnology and
analysis and modeling, theoretical and experimental research		<ul style="list-style-type: none"> biotech functions, principles of cell culture; –the essence of molecular genetics methods; –the steps of isolating the desired products
	able to	<ul style="list-style-type: none"> –conduct experimental research and testing of the specified method, using mathematical processing of experimental data; –to use the language of molecular biotechnology; –choose biological objects
	own	<ul style="list-style-type: none"> –improving the methods and principles of industrial microbiology and biotechnology; –basic laws of natural sciences in industrial microbiology and biotechnology, by mathematical analysis and simulation, theoretical and

		experimental studies
PC-2 ability to implement biotechnology and process management	Know	<ul style="list-style-type: none"> -modern achievements of biological sciences and biomedical technologies; -basic principles of metabolic and growth rate regulation of microorganisms, the methods of the cultivation of microorganisms, the quantitative characteristics of crop growth, equipment for cultivation of microorganisms, the microorganisms deposited; -major producers and methods for producing biotechnological drug substances and their physical, chemical and pharmacological properties. -Biotechnological processes in the production and manufacture of drugs; -major biotechnological process steps; -biocenosis natural resources both sources of biologically active substances (BAS); -techniques, methods and principles for the implementation and management of biotechnological processes
	able to	<ul style="list-style-type: none"> - carry out biotechnological processes for production and preparation of biologically active substances and the individual components of microbial cells; - carry out biotechnological processes and the manufacture of medicaments; - perform stepwise control and standardization of preparations obtained (definition antimicrobial activity of antibiotic activity of enzyme preparations, viability of the microorganisms); - conduct isolation and purification of biologically active substances from the biomass and the culture liquid; - adjust and improve the biotechnological process to obtain a high quality finished product; - ensure compliance with the rules of industrial hygiene, environmental protection, occupational health and safety

	own	<ul style="list-style-type: none"> –managed cultivation methods of microorganisms; –methods of immobilizing microbial cells –technology of obtaining biologically active substances and the individual components of microbial cells; –capacity for implementation and management of biotechnological processes
<p>UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body</p>	Know	<ul style="list-style-type: none"> –the physical nature of the phenomena and processes in the body; –structure of the human body in conjunction with the functions of organs and systems; –methods for constructing models of physiological systems at the subcellular, cellular, tissue and system levels of the human body; –methods for solving problems of identification parameters and isolating informative signs on actual clinical and experimental data; –methods for studying the biochemical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	able to	<ul style="list-style-type: none"> –apply a model organism known systems for the analysis of physiological processes and conditions. –identify the model parameters from experimental data or the results of clinical studies; –carry out applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	own	<ul style="list-style-type: none"> –methods for studying the biochemical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body; –methods of application and practical projects to study the biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system levels in the human body
<p>UC-6 the ability to use knowledge of the basics of biomedical and biotechnological</p>	Know	<ul style="list-style-type: none"> –the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms;

productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling		<ul style="list-style-type: none"> –methods of hardware design and manufacturing technology using specialized biologics microbiological synthesis, biocatalysis, Genetic Engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; –the basic requirements to microorganisms - producers
	able to	<ul style="list-style-type: none"> –apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	<ul style="list-style-type: none"> –modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; –independent methods retrieve and analyze information in the field of industrial microbiology and biotechnology; –Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work
UC-8 obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation	Know	<ul style="list-style-type: none"> –theoretical fundamentals of various biotechnological products; –patterns of kinetics of growth of microorganisms and formation of metabolic products; –microorganism culturing methods classification of enzymes, enzyme activity units; –methods of producing enzyme preparations; the application of enzymes in medicine.
	able to	<ul style="list-style-type: none"> –lead microorganism culture process, cell cultures, plants and animals; –select optimum conditions enabling the maximum accumulation of the desired product; –carry out the isolation, identification and culturing of microorganisms producing the biomass and the various metabolic products; –work with pure cultures of microorganisms, plants and animals; –secrete enzymes of various objects, to investigate the properties and to determine the kinetic parameters of enzymes;

		<ul style="list-style-type: none"> -evaluate the quantitative characteristics of the growth of microorganisms
	own	<ul style="list-style-type: none"> -methods of work with microorganisms, cultures, plant and animal cells; the rules of safe operation in the lab; -methods of calculating the basic parameters of biotechnological processes; -biotransformation methods; -obtaining principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation
UC-9 possession of modern approaches to the design of drugs and diagnostic agents	Know	<ul style="list-style-type: none"> -Innovative ways of creating drugs based on the data using genomics, proteomics and bioinformatics; -New methods and techniques in the design, production and circulation of drugs; -methods for determining the purity of microorganisms-producers, determine the concentration of viable cells and their enzymatic activity.
	able to	<ul style="list-style-type: none"> -conduct research on the improvement of biotechnological processes; -use new methods and techniques in the field of drug design and diagnostic products.
	own	<ul style="list-style-type: none"> -new techniques and methods in the field of designing drugs and diagnostic agents; -physico-chemical, microbiological and biochemical analysis methods for producing confirm purity authentication drugs, detection and quantification of the impurities; -the ability to participate in research; -skills introduction of new methods and techniques in designing drugs and diagnostic drugs.

For the formation of the above competencies in the discipline "Pharmaceutical Biotechnology", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"Industrial Microbiology and Biotechnology »
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.01.02 "Industrial Microbiology and Biotechnology" is written for professional educational program on a profile "Molecular Biotechnology" 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 in the undergraduate program 19.03.01 Biotechnology.

Subject B1.V.DV.01.02 "Industrial Microbiology and Biotechnology" is included in the variable part of compulsory subjects of educational branch of undergraduate programs in the profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology.

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides lectures (18 hours) and practical classes (seminars) (54 hours), laboratory work (36 hours), independent work of students (108 hours, including the preparation for the exam - 36 hours). Subject is implemented on 4 course 7 semester.

The development of the discipline is carried out in parallel and closely connected with the study disciplines: "Introduction to biotechnology and professional activity", "Fundamentals of Biotechnology", "General Biology and Microbiology", "Biology". Is prior to subsequent study subjects "Applied Microbiology", "Industrial biotechnology", "Pharmaceutical Biotechnology", "Marine Biotechnology", "aquatic Biotechnology" et al.

Assessment of learning outcomes: Exam.

Goal:

formation and development of culture in general, general and professional competencies needed for careers in Industrial Microbiology and Biotechnology of the organization and implementation of cell medical technologies in the field of biomedicine

Tasks:

12) learning the basics Industrial Microbiology and Biotechnology, patterns underlying processes Biotechnology;

13)the study existing biotech industries, their technical equipment, installation of processing equipment;

14)familiarization with the main stages of industrial production and the management of the main operating steps of the biotechnological productions;

15)familiarization with optimal and rational technological schemes;

16)study of scientific and technical information on the development of new trends in industrial biotechnology;

17)the study of objects of biotechnology and biotech functions;

18)the study of biological systems that are used in molecular biotechnology.

For successful study of discipline "Industrial Microbiology and Biotechnology "in studying the following preliminary knowledge and ability to be formed:

- the basics of biology, biochemical characteristics of the main sub-cellular components, the basic laws of animal and plant reproductive biology;

- understanding of the fundamental principles and levels of biological organization, regulatory mechanisms operating at every level;

- representation of the structure of the gene, mutagenesis, the principles of genetic engineering of population genetics and evolutionary genetics, genetic bases and methods of breeding;

- the effects of human impacts on the biosphere, ecological principles of environmental management

- of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena

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

Code and the wording of competence	Stages of formation of competence	
<p>GPC-2 the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research</p>	Know	<ul style="list-style-type: none"> –basic concepts, formulas and laws of natural sciences in professional activities, methods of mathematical analysis and modeling, theoretical and experimental research; –biotechnological aspects used in biotechnology; –objects of biotechnology and biotech functions, principles of cell culture; –the essence of molecular genetics methods; –the steps of isolating the desired products
	able to	<ul style="list-style-type: none"> –conduct experimental research and testing of the specified method, using mathematical processing of experimental data;

		<ul style="list-style-type: none"> -to use the language of molecular biotechnology; -choose biological objects
	own	<ul style="list-style-type: none"> -improving the methods and principles of industrial microbiology and biotechnology; -basic laws of natural sciences in industrial microbiology and biotechnology, by mathematical analysis and simulation, theoretical and experimental studies
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> -basic principles of metabolic and growth rate regulation of microorganisms, the methods of the cultivation of microorganisms, the quantitative characteristics of crop growth, equipment for cultivation of microorganisms, deposited microorganisms; -major biotechnological process steps; -techniques, methods and principles for the implementation and management of biotechnological processes; -modern achievements of Biological Sciences and Biomedical Technologies
	able to	<ul style="list-style-type: none"> -adjust and improve the biotechnological process to obtain a high quality finished product; -carry out biotechnological processes for production and preparation of biologically active substances and the individual components of microbial cells; -conduct isolation and purification of biologically active substances from the biomass and the culture liquid; -perform stepwise control and standardization of preparations obtained (definition antimicrobial activity of antibiotic activity of enzyme preparations, viability of the microorganisms); -ensure compliance with the rules of industrial hygiene, environmental protection, occupational health and safety; -choose the optimum storage conditions for biological products and evaluate their quality during extended storage
	own	<ul style="list-style-type: none"> -managed cultivation methods of microorganisms; -methods of immobilizing microbial cells; -technology of obtaining biologically active substances and the individual components of microbial cells; -capacity for implementation and management of

		biotechnological processes
PC-8 ability to work with scientific and technical information, the use of the Russian and international experience in professional work	Know	<ul style="list-style-type: none"> –principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	<ul style="list-style-type: none"> –extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	<ul style="list-style-type: none"> –evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability of scientific information; –ability to work with scientific and technical information, to use the Russian and international experience in professional work
PC-17 the ability to develop the basic stages of biotechnological process	Know	<ul style="list-style-type: none"> –Basics of Industrial Microbiology and Biotechnology, the regularities underlying the processes of biotechnology; –current biotech production, their technical equipment, installation of processing equipment; –main stages of industrial production and management of the main operating steps of the biotechnological productions; –Production and technology ORGANIZATION process and production of biotechnological products
	able to	<ul style="list-style-type: none"> –develop basic stages biotechnological process using optimal and rational process flow diagrams; –keep the main technological processes for the production of biotechnological products; –apply biotechnology using genetically engineered producers - microorganisms, plant and animal cells;

		<ul style="list-style-type: none"> -to apply advanced methods of selection and operation of process equipment in the production of biotechnological products
	own	<ul style="list-style-type: none"> -methods and principles of the development main stages of biotechnological processes; -methods and principles of the development of equipment layout plans, technical equipment and organization of jobs within the company adopted the production technology of biotechnology products
<p>UC-6</p> <p>the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling</p>	Know	<ul style="list-style-type: none"> -the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms; -methods of hardware design and manufacturing technology using specialized biologics microbiological synthesis, biocatalysis, Genetic Engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; -the basic requirements to microorganisms - producers.
	able to	<ul style="list-style-type: none"> -apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	<ul style="list-style-type: none"> -modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; - methods of independent research and analysis of information in the field of industrial microbiology and biotechnology; -Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work
<p>UC-8</p> <p>obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of</p>	Know	<ul style="list-style-type: none"> -patterns of growth of marine and freshwater producing biotechnologically important objects; -ways of intensification of traditional biotechnologies
	able to	<ul style="list-style-type: none"> -make the concept of biotechnological production; -biological objects to create new methods of cell and genetic engineering

biosynthesis and biotransformation		
	own	<ul style="list-style-type: none"> –methods of calculating the basic parameters of biotechnological equipment; –methods of regulating the biosynthesis of primary and secondary metabolites

For the formation of the above competencies in the discipline "Industrial Microbiology and Biotechnology", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"Plant Biotechnology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides lectures (36 hours) and practical classes (seminars) (36 hours), laboratory work (36 hours), independent work of students (72 hours, including the preparation for the exam - 36 hours). Subject is implemented on 4 course 8 semester.

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

Code and the wording of competence	Stages of formation of competence	
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–the concept of the structure of matter; –main directions and problems of modern concepts of Russian and foreign scientists about the physical world and the structure of matter to understand the surrounding world and natural phenomena
	able to	–to distinguish scientific knowledge from unscientific; to apply knowledge –physical and chemical laws to describe the natural scientific picture of the world; –give practical assessment of modern physical picture of the world on the basis of certain provisions of the theory of the structure of matter
	own	–skills analysis of natural phenomena and processes using the concepts of natural science picture of the world; –ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena
PC-2 capacity for implementation and management of	Know	–basic principles of metabolic and growth rate regulation of microorganisms, the methods of the cultivation of microorganisms, the quantitative characteristics of crop growth, equipment for

biotechnological processes		<p>cultivation of microorganisms, deposited microorganisms;</p> <ul style="list-style-type: none"> –major biotechnological process steps; –techniques, methods and principles for the implementation and management of biotechnological processes; –modern achievements of Biological Sciences and Biomedical Technologies
	able to	<ul style="list-style-type: none"> –adjust and improve the biotechnological process to obtain a high quality finished product; –carry out biotechnological processes for production and preparation of biologically active substances and the individual components of microbial cells; –conduct isolation and purification of biologically active substances from the biomass and the culture liquid; –perform stepwise control and standardization of preparations obtained (definition antimicrobial activity of antibiotic activity of enzyme preparations, viability of the microorganisms); –ensure compliance with the rules of industrial hygiene, environmental protection, occupational health and safety; –choose the optimum storage conditions for biological products and evaluate their quality during extended storage
	own	<ul style="list-style-type: none"> –managed cultivation methods of microorganisms; –methods of immobilizing microbial cells; –technology of obtaining biologically active substances and the individual components of microbial cells; –capacity for implementation and management of biotechnological processes
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	<ul style="list-style-type: none"> –basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	<ul style="list-style-type: none"> –protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	<ul style="list-style-type: none"> –skills to protect industrial workers and the public

		from the possible consequences of accidents, catastrophes, natural disasters
PC-8 ability to work with scientific and technical information, the use of the Russian and international experience in professional work	Know	<ul style="list-style-type: none"> –principles and characteristics of the organization and the accumulation of scientific information in the medical laboratory diagnostics technologies; –mechanisms and tools necessary for professional applications in the field of production, storage and processing of scientific information
	able to	<ul style="list-style-type: none"> –extract scientific information from relevant sources; solve typical educational and research tasks in the field of methods, ways and means of receiving, storing, processing information; –work with scientific and technical information, to use the Russian and international experience in professional work
	own	<ul style="list-style-type: none"> –evidence-based medicine based on the search for solutions with the use of theoretical knowledge and practical skills; –skills of independent work with educational and scientific literature on the subject of research; –skills of analysis and evaluation of the reliability of scientific information; –ability to work with scientific and technical information, to use the Russian and international experience in professional work
PC-17 the ability to develop the basic stages of biotechnological process	Know	<ul style="list-style-type: none"> –Basics of Industrial Microbiology and Biotechnology, the regularities underlying the processes of biotechnology; –current biotech production, their technical equipment, installation of processing equipment; –main stages of industrial production and management of the main operating steps of the biotechnological productions; –Production and technology ORGANIZATION process and production of biotechnological products
	able to	<ul style="list-style-type: none"> –develop basic stages biotechnological process using optimal and rational process flow diagrams; –keep the main technological processes for the production of biotechnological products; –apply biotechnology using genetically engineered producers - microorganisms, plant and animal cells; –to apply advanced methods of selection and

		operation of process equipment in the production of biotechnological products
	own	<ul style="list-style-type: none"> –methods and principles of the development main stages of biotechnological processes; –methods and principles of the development of equipment layout plans, technical equipment and organization of jobs within the company adopted the production technology of biotechnology products
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	<ul style="list-style-type: none"> –the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms; –methods of hardware design and manufacturing technology using specialized biologics microbiological synthesis, biocatalysis, Genetic Engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; –the basic requirements to microorganisms - producers.
	able to	–apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	<ul style="list-style-type: none"> –modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; - methods of independent research and analysis of information in the field of industrial microbiology and biotechnology; –Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work
UC-8	Know	<ul style="list-style-type: none"> –theoretical fundamentals of various biotechnological products; –patterns of kinetics of growth of microorganisms and formation of metabolic products; –microorganism culturing methods –classification of enzymes, –a unit of enzyme activity;

		–methods of producing enzyme preparations; the application of enzymes in medicine
	able to	–lead microorganism culture process, cell cultures, plants and animals; select optimum conditions enabling the maximum accumulation of the desired product; –carry out the isolation, identification and culturing of microorganisms producing the biomass and the various metabolic products; –work with pure cultures of microorganisms, plants and animals; secrete enzymes from various objects to investigate and determine the kinetic properties –parameters of enzymes; –evaluate the quantitative characteristics of the growth of microorganisms
	own	–methods of work with microorganisms, cultures, plant and animal cells; the rules of safe operation in the lab; –methods of calculating the basic parameters of biotechnological processes; –biotransformation methods; –obtaining principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation

For the formation of the above competencies in the discipline "Industrial Microbiology and Biotechnology", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"aquatic biotechnology "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.02.02 "aquatic biotechnology" is written for professional education on the profile of the program "Molecular Biotechnology" 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 ongoing basic vocational education programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides lectures (36 hours) and practical classes (seminars) (36 hours), laboratory work (36 hours), independent work of students (72 hours, including the preparation for the exam - 36 hours). Subject is implemented on 4 course 8 semester.

Contents "aquatic biotechnology" encompasses knowledge in the field of marine biomedicine (development of new pharmaceuticals) material technology.

We consider a wide range of problems associated with obtaining, purification, identification and pharmacological characterization of biologically active substances (BAS) marine organisms. Examines the causes of the great theoretical and practical interest in the natural chemical compounds of marine origin. Based on the analysis of contemporary scientific information considering the possibility of marine organisms as a source of biologically active substances with the aim of using them in the domestic medicine and the pharmaceutical industry.

During learning mastered studying methods of identification of different groups of aquatic organisms, the methods of evaluation of their physiological status, particularly techniques for working with the cells and molecules of these organisms.

Requirements for the "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements obtained in the course of development of the previous disciplines: "Biology", "Physiology of the basics of anatomy," "Molecular and Cellular Biology", "General Biology microbiology ", " biochemistry ", "Bioorganic chemistry", " Cell Biomedical Technologies ", " Fundamentals of Biotechnology ", " Industrial Microbiology and

Biotechnology ", " Pharmaceutical Biotechnology "" The processes and apparatus of biotechnology. " For successful study of discipline "Biotechnology of aquatic organisms" in students the following preliminary competences should be formed:

- the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);
- readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);
- the ability to use modern methods and technologies (including information) in a professional activity (GPC5);
- the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research (GPC-2).

The purpose of the development of the discipline Students acquire knowledge about modern biotechnology application aquatic organisms, as well as practical skills of experimental research in the field of cell and molecular gidrobiotehnologii and aquaculture.

Tasks:

- 1) the study of the biochemical characteristics of the aquatic organisms and their biotechnological potential;
- 2) study of the basic processes in the biotechnology of aquatic organisms;
- 3) exploring technology protein products and analog products on the basis of aquatic organisms;
- 4) studying bioproducts technology based on aquatic lipids;
- 5) development of scientific bases of production and application of biological regulators of technological processes;
- 6) Technology study of biopolymers-builders of aquatic organisms;
- 7) mastering the basics of highly biologics technology.

As a result of studying this discipline in students formed general professional, occupational and universal competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the	Know	–manifestations of the fundamental properties of a living at different levels of organization; –physical, chemical, physicochemical and biological processes in the aquatic ecosystem; –a variety of marine and freshwater organisms of interest for biotechnology

structure of matter to understand the surrounding world and natural phenomena	able to	–plan, conduct an experiment and analyze the results
	own	–skills with a specialized scientific literature for professional applications
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	Know	–Technical means and methods for measuring the basic parameters of biotechnological processes, the properties of raw materials and products
	able to	–exercise process in accordance with the rules; –select a rational scheme biotechnological production of the desired product; –apply biotechnology to the methodology of the aquatic ecosystem for professional applications
	own	–main methods of experimental and theoretical research in the field of aquatic biotechnology; –main types of biotechnological process control systems
PC-2 capacity for implementation and management of biotechnological processes	Know	–basic production scheme based on a process of bioconversion of living aquatic resources; –Safety requirements and operation of technological equipment protection
	able to	–make the concept of biotechnological production with the use of raw materials of marine and freshwater origin; –optimize biotechnological processes and schemes
	own	–software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes; –Knowledge for the commercialization of biotechnological production
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	–basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	–protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	–skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters

PC-17 the ability to develop the basic stages of biotechnological process	Know	–key stage biotechnological production of various categories of marine raw materials.
	able to	–plan biotechnological process to obtain the desired product
	own	–methods of cell and molecular biotechnology gidrobiontov
UC-8 obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation	Know	–patterns of growth of marine and freshwater producing biotechnologically important objects; –ways of intensification of traditional biotechnologies
	able to	–make the concept of biotechnological production; –biological objects to create new methods of cell and genetic engineering
	own	–methods of calculating the basic parameters of biotechnological equipment; –methods of regulating the biosynthesis of primary and secondary metabolites

A special feature in the design and content of the course is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming"), software and hardware, fund teaching, evaluation and electronic means of discipline.

ANNOTATION
educational complex discipline
"Medical Biotechnology"
educational profile of the program
"Molecular Biotechnology"
areas of training 19.03.01 Biotechnology

Course syllabus B1.V.DV.03.01 "Medical Biotechnology" drawn up for the professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides 36 hours of lectures, laboratory work (36 hours) and practical classes (36 hours), an independent student work (72 hours).

Subject B1.V.DV.03.01 "Medical Biotechnology" is included in the variable component of disciplines at the choice of the educational program for undergraduate profile "Molecular Biotechnology" areas of training 19.03.01 Biotechnology and sold on the 4th year, 7 semester.

Contents covers the following issues:

- Methods of molecular construction of vectors for expression in various organisms;
- the creation of the transgenic cell lines;
- and production of transgenic proteins in various cell systems.

Development of discipline is closely linked with the study subjects: "Biochemistry", "Biology", "Genetics", "Molecular and Cellular Biology", "Biomedical cell technology."

a view to discipline "Medical Biotechnology" is to teach students the basic methods of work with genetically engineered structures and the formation of complex ideas about the use of medical biotechnology in biomedicine.

Tasks:

- 1) explore the theoretical foundations of molecular biology and genetic engineering;
- 2) acquainted with methods of PCR and molecular cloning;
- 3) acquainted with the methods of analysis of nucleotide sequences;
- 4) explore the basic techniques of working with cultures of human cancer cells;
- 5) study the theoretical basis of action of anticancer drugs.

As a result of studying this discipline in students formed following general professional, occupational and special professional competence (competency elements):

Code and the wording of competence	Stages of formation of competences	
GPC5 the ability to use modern methods and technologies (including information) in professional activity	Know	<ul style="list-style-type: none"> – modern methods and technology (including information) the development of new trends in industrial biotechnology; – the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in industrial biotechnology; – How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> – the use of modern methods and technologies (including information) in molecular biotechnology; – use the software for professional applications; – use the services and information resources of the Internet in Molecular Biotechnology
	own	<ul style="list-style-type: none"> – Modern methods and technologies (including information) in molecular biotechnology; – basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
PC-9 possession of the main methods and techniques of experimental research in their professional field	Know	<ul style="list-style-type: none"> – principles and methods of organizing and conducting experimental studies, the main features of modern devices and equipment for chemical research, as well as the methods and the data processing and analysis tools
	able to	<ul style="list-style-type: none"> – plan and carry out the necessary research, to carry out processing of the results
	own	<ul style="list-style-type: none"> – the skills of the chemical processing of research, analysis and reporting of the results
UC-4 the capacity for evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications	Know	<ul style="list-style-type: none"> – morpho-functional, physiological state and pathological processes in the human body for professional applications
	able to	<ul style="list-style-type: none"> – evaluate the morphological and functional, physiological state and pathological processes in the human body for professional applications
	own	<ul style="list-style-type: none"> – principles and methods of evaluation of morphological and functional, physiological conditions and pathological processes in the human body for professional applications

UC-5 the ability and willingness to implement the applied and practical projects to study the biochemical, biophysical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body	Know	–methods for studying the biochemical and physiological processes and phenomena that occur at the cellular, organ and system levels in the human body
	able to	–set goals, implement the scientific research, the development of an experiment for the study of biochemical and physiological processes and phenomena, taking place at the cellular, organ and system levels in the human body
	own	–methods for studying the biochemical and physiological processes and phenomena; –principles implementation and practical application projects to study biochemical, biophysical and physiological processes and events occurring at the cellular, organ and system levels in the human body
UC-6 the ability to use knowledge of the basics of biomedical and biotechnological productions, microbiological synthesis, biocatalysis, genetic engineering, nanobiotechnology, molecular modeling	Know	–the theoretical basis of the most important technological and microbiological processes and their practical application for an industrial way of micro-organisms; –methods, equipment design and manufacturing technology of specialized biologics using microbiological synthesis, biocatalysis, –genetic engineering; bases of microbial biotechnology, breeding and genetic engineering of microorganisms; the basic requirements to microorganisms - producers
	able to	–apply modern ideas about the basics of biotechnological production, genetic engineering in the selection and study of microorganisms-producers; use knowledge about the basics of microbial biotechnology, plant breeding to meet the challenges in the national economy
	own	–modern concepts of genetic engineering techniques, nanobiotechnology, molecular modeling for biotechnology purposes; - methods of independent research and analysis of information in the field of industrial microbiology and biotechnology; –Search methods, selection and study of microorganisms; Knowledge of modern equipment and machinery to carry out research work
UC-9 knowledge of	Know	–modern concept of the production of medicines and

modern approaches to the design of drugs and diagnostic agents		the stages of their biotechnological production
	able to	–use the software for the design of drugs
	own	–search skills of the scientific literature on the design of drugs and diagnostic agents

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

Lectures:

1. Lecture visualization
2. Lecture-discussion

Practical lessons:

1. Seminar-debate
2. Workshop
3. The detailed conversation
4. Laboratory work

Course syllabus
“Marine Biotechnology”
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.03.02 "Marine Biotechnology" drawn up for the professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology.

The total complexity of development disciplines of 6 credits, 216 hours. Curriculum provides 36 hours of lectures, laboratory work (36 hours) and practical classes (36 hours), an independent student work (72 hours)

Contents "Marine Biotechnology" encompasses knowledge in aquaculture, the hydrosphere Bioecology, materials science, bioremediation, molecular genetics, genomics and bioinformatics. During the training the student will be developed methods to identify different groups of aquatic organisms and methods of their content in artificial conditions, estimation methods of their physiological status, particularly techniques for working with the cells and molecules of these organisms.

Requirements for the "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements obtained in the course of development of the previous disciplines: "Biology", "Physiology of the basics of anatomy," "Molecular and Cellular Biology "," General Biology microbiology "," biochemistry ","Bioorganic chemistry"," Cell Biomedical Technologies "," Fundamentals of Biotechnology "," Industrial Microbiology and Biotechnology "," Pharmaceutical Biotechnology "" The processes and apparatus of biotechnology. "For successful study of discipline" Marine Biotechnology "among students following preliminary competences should be formed:

- the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);
- readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);

– the ability to use modern methods and technologies (including information) in a professional activity (GPC5);

– the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research (GPC-2).

The purpose of the development of the discipline Students acquire knowledge about modern biotechnology application aquatic organisms, as well as practical skills of experimental research in the field of cell and molecular hydrobiotechnology and aquaculture.

Tasks:

- 1) to provide a basic understanding of the aquatic ecosystem;
- 2) to study the ecology, biology and biodiversity of aquatic organisms;
- 3) understand the molecular structure, genetics, cell organization and evolutionary processes aquatic organisms;
- 4) know and understand the basic facts and concepts related to hydrobiotechnology ;
- 5) Know aquatic of interest to biotechnology, and their key features and role in the ecosystem.
- 6) to know and apply the methodology of biotechnology to the aquatic environment and its inhabitants;
- 7) obtain knowledge about biotechnology company engaged in breeding, processing and yield the expected raw aquatic organisms.

As a result of studying this discipline in students formed general professional, occupational and universal competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	–manifestations of the fundamental properties of a living at different levels of organization; –physical, chemical, physicochemical and biological processes in the aquatic ecosystem; –a variety of marine and freshwater organisms of interest for biotechnology
	able to	–plan, conduct an experiment and analyze the results
	own	–skills with a specialized scientific literature for professional applications
PC-1 ability to perform process in compliance	Know	–Technical means and methods for measuring the basic parameters of biotechnological processes, the properties of raw materials and products

with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	able to	<ul style="list-style-type: none"> –exercise process in accordance with the rules; –select a rational scheme biotechnological production of the desired product; –apply biotechnology to the methodology of the aquatic ecosystem for professional applications
	own	<ul style="list-style-type: none"> –main methods of experimental and theoretical research in the field of aquatic biotechnology; –main types of biotechnological process control systems
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> –basic production scheme based on a process of bioconversion of living aquatic resources; –Safety requirements and operation of technological equipment protection
	able to	<ul style="list-style-type: none"> –make the concept of biotechnological production with the use of raw materials of marine and freshwater origin; –optimize biotechnological processes and schemes
	own	<ul style="list-style-type: none"> –software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes; –Knowledge for the commercialization of biotechnological production
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	<ul style="list-style-type: none"> –basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	<ul style="list-style-type: none"> –protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	<ul style="list-style-type: none"> –skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters
PC-17 the ability to develop the basic stages of biotechnological process	Know	<ul style="list-style-type: none"> –key stage biotechnological production of various categories of marine raw materials.
	able to	<ul style="list-style-type: none"> –plan biotechnological process to obtain the desired product
	own	<ul style="list-style-type: none"> –methods of cell and molecular biotechnology gidrobiontov
UC-8	Know	<ul style="list-style-type: none"> –patterns of growth of marine and freshwater

obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation		producing biotechnologically important objects; –ways of intensification of traditional biotechnologies
	able to	–make the concept of biotechnological production; –biological objects to create new methods of cell and genetic engineering
	own	–methods of calculating the basic parameters of biotechnological equipment; –methods of regulating the biosynthesis of primary and secondary metabolites

A special feature in the design and content of the course is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming"), software and hardware, fund teaching, evaluation and electronic means of discipline.

Course syllabus
"Management and economics in biotechnology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.04.01 "Management and economics of biotechnology" is written for professional educational program on a profile "Molecular Biotechnology" 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 in the branch of undergraduate program 03.19.01 Biotechnology.

Subject is implemented in 7 semester of the 4th year of the educational program "Molecular Biotechnology". The total complexity of the development of the discipline is an Official 4 units (144 hours). Curriculum provides lecture (18 hours) and practical classes (36 hours), independent work (90 hours).

Contents of the discipline "Management and economics of biotechnology" encompasses knowledge in the field of management, organization, management and economics of biotechnology industries, production efficiency and product competitiveness.

We consider a wide range of issues related to the economic evaluation of new technological solutions, with the introduction of biotechnology research and development results, with the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards.

During the training, trainees mastered the principles of management of individual stages of existing biotech industries; principles refinement and development of technological processes in preparation for the production of new products; study of scientific and technical and organizational solutions based on economic analysis and others.

Requirements "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements received during the preceding development disciplines, "Industrial Microbiology and Biotechnology" "Pharmaceutical Biotechnology" "The processes and apparatus of biotechnology."

For successful study of discipline "Management and economics of biotechnology" in students the following preliminary competences should be formed:

- the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);
- readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);
- the ability to use modern methods and technologies (including information) in a professional activity (GPC5).

The purpose of the development of the discipline Students acquire knowledge of modern economic organization biotechnological process, study the scientific, technical and organizational decisions based on economic analysis.

Tasks:

- 1) study of the modernization of production processes in preparation for the production of new products;
- 2) development of methods of commercialization of biotechnological production;
- 3) learning management fundamentals and business planning, investment and innovation for the successful introduction of scientific developments into production;
- 4) development of a strategy of effective development, leading to increased competitiveness and financial stability.

As a result of studying this discipline in students form general professional and professional competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC-7 ability to find and evaluate new technology solutions to implement the results of biotechnology research and development	Know	–theoretical bases of biotechnology and biotechnological production bases; –new and promising methods in the field of biotechnology; –Principles controlling individual operating stages biotechnological productions; –principles refinement and development of technological processes in preparation for the production of new products; –importance of biotechnology for the development of society, its social impact and the bioeconomy;
	able to	–find and evaluate new technology solutions to

		<p>implement the results of biotechnology research and development;</p> <ul style="list-style-type: none"> –work with scientific and technical information, to use the Russian and international experience in the profession; –develop processes in preparation for the production of new products; –develop and implement new technological and methodological solutions; –collect and prepare input data for the selection and justification of scientific, technical and organizational decisions based on economic analysis
	own	<ul style="list-style-type: none"> –complex knowledge and skills in the field of modern goals and objectives of Molecular Biotechnology, main trends and prospects of development; –methods of collecting and preparing basic data for selection and study of scientific and technical and organizational decisions based on economic analysis; –principles and methods of finding and evaluating new technological solutions, the ability to implement the results of biotechnology research and development
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> –concepts biotechnological production; –major biotechnological process steps; –principles for the implementation and management of biotechnological processes
	able to	<ul style="list-style-type: none"> –control individual operating stages biotechnological productions; –organize the provision of jobs and their technical equipment, installation of processing equipment; –develop operational plans of the primary production units
	own	<ul style="list-style-type: none"> –software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes; –Knowledge for the commercialization of biotechnological production; –capacity for implementation and management of biotechnological processes
PC-5 the ability to organize the work of artists, find and make administrative decisions	Know	<ul style="list-style-type: none"> –common approaches organization of the performers; –principles and methods of organization of workplaces, their technical equipment, installation of processing equipment; –the basic concepts of the organization of labor; labor

in the field of organization and regulation of labor		norms
	able to	–organize the work of artists, find and make administrative decisions in the field of organization and regulation of labor
	own	–skills to organizing the work of performers; –skills workplace organization, their technical equipment, process equipment; –management decision-making skills in the organization and regulation of labor
PC-6 readiness for the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards	Know	–general provisions and medical-biological requirements for the quality of biotechnology products; –the main directions of the state policy in the field of biomedical cell products; –the main directions of technological advances in the medical and pharmaceutical biotechnology, development of new biotechnology and biomedical cell products
	able to	–use and meets the requirements of Russian and international quality standards; –support the modernization and optimization of existing production processes based on a systematic approach to the analysis of quality of raw materials, the process and requirements of the final product; –issue documentation and implement the quality management system
	own	–norms and requirements of medical, biotechnological sciences, quality and cost, safety and environmental performance to create a biomedical cell products; –the methods and principles of quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards; –the basic principles of state policy in the field of biomedical cell technologies
PC-7 ability to organize and summarize the information on the formation and use of resources of the enterprise	Know	–the structure of technological solutions and their adjustment during the industrial testing of advanced biotechnology and new biotechnological products with a view to optimizing costs and improving product quality; –composition of production and non-operating expenses and modernized production of biotechnology products;

		<ul style="list-style-type: none"> -performance indicators of technological processes of production of biotechnology products; -Methods and means of collecting, processing, storage, transmission and storage information using the basic system software and application software packages in the production of biotechnological products; -resource support biotechnological production
	able to	<ul style="list-style-type: none"> -apply the method of calculation of technical and economic efficiency of the production of biotechnological products in the selection of optimal technical and organizational solutions; -use technologies for collecting, loading, storage, storage, conversion and transmission of data in a professional-oriented information systems biotechnological production
	own	<ul style="list-style-type: none"> -design changes to the technical and technological documentation for adjusting technological processes, control systems, production of biotechnology products; -preparation of proposals to improve the efficiency of production and competitiveness of products aimed at the rational use and reduce consumption of raw materials, reduce the labor intensity of production, increase productivity, economical use of energy resources in the enterprise, the introduction of non-waste and low-waste technologies biotechnological production

A special feature in the design and content of the course is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming"), software and hardware, fund teaching, evaluation and electronic means of discipline.

Course syllabus
"Bioeconomics "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

"Molecular Biotechnology" in accordance with the "Far Eastern Federal University" the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education working program of discipline B1.V.DV.04.02 "Bioeconomics" composed for the professional educational program on a structure for ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

Subject is implemented in 7 semester of the 4th year of the educational program "Molecular Biotechnology". The total complexity of the development of the discipline is an Official 4 units (144 hours). Curriculum provides lecture (18 hours) and practical classes (36 hours), independent work (90 hours).

Contents "Bioeconomics" discipline covers the knowledge of the high-tech part of the economy, the main components of which are the development, deployment and use of cellular technologies, achievements of genomics and proteomics to obtain new products and processes, as well as the integration of knowledge and applications in various sectors of the economy and business.

Subject "Bioeconomics" considers the practical aspects of economy biotechnological productions, realization of economic mechanism biotechnologies theories mechanisms and processes at the genetic and molecular levels, and their use in an industrial process in the field of production efficiency and the product competitiveness.

We consider a wide range of issues related to the economic evaluation of new technological solutions, with the introduction of biotechnology research and development results, with the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards.

During the training, trainees mastered the principles of management of individual stages of existing biotech industries; principles refinement and development of technological processes in preparation for the production of new products; study of scientific and technical and organizational solutions based on economic analysis and others.

Requirements "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements received during the preceding development disciplines, "Industrial Microbiology and Biotechnology" "Pharmaceutical Biotechnology" "The processes and apparatus of biotechnology."

To successfully study the "Bioeconomics" discipline among students following preliminary competences should be formed:

- the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);
- readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);
- the ability to use modern methods and technologies (including information) in a professional activity (GPC5).

The purpose of the development of the discipline Students acquire knowledge of modern economic organization biotechnological process, study the scientific, technical and organizational decisions based on economic analysis.

Tasks:

- 1) assimilation methodological foundations of the bioeconomy;
- 2) bioeconomical study as an integral base of economic development;
- 3) study of the modernization of production processes in preparation for the production of new products;
- 4) development of methods of commercialization of biotechnological production;
- 5) learning management fundamentals and business planning, investment and innovation for the successful introduction of scientific developments into production;
- 6) development of a strategy of effective development, leading to increased competitiveness and financial stability.

As a result of studying this discipline in students form general professional and professional competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC-7 ability to find and evaluate new technology solutions to implement the results of	Know	–theoretical bases of biotechnology and biotechnological production bases; –new and promising methods in the field of biotechnology; –Principles controlling individual operating stages

biotechnology research and development		<p>biotechnological productions;</p> <ul style="list-style-type: none"> –principles refinement and development of technological processes in preparation for the production of new products; –importance of biotechnology for the development of society, its social impact and the bioeconomy;
	able to	<ul style="list-style-type: none"> –find and evaluate new technology solutions to implement the results of biotechnology research and development; –work with scientific and technical information, to use the Russian and international experience in the profession; –develop processes in preparation for the production of new products; –develop and implement new technological and methodological solutions; –collect and prepare input data for the selection and justification of scientific, technical and organizational decisions based on economic analysis
	own	<ul style="list-style-type: none"> –complex knowledge and skills in the field of modern goals and objectives of Molecular Biotechnology, main trends and prospects of development; –methods of collecting and preparing basic data for selection and study of scientific and technical and organizational decisions based on economic analysis; –principles and methods of finding and evaluating new technological solutions, the ability to implement the results of biotechnology research and development
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> –concepts biotechnological production; –major biotechnological process steps; –principles for the implementation and management of biotechnological processes
	able to	<ul style="list-style-type: none"> –control individual operating stages biotechnological productions; –organize the provision of jobs and their technical equipment, installation of processing equipment; –develop operational plans of the primary production units
	own	<ul style="list-style-type: none"> –software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes; –Knowledge for the commercialization of biotechnological production;

		<ul style="list-style-type: none"> –capacity for implementation and management of biotechnological processes
<p>PC-5 the ability to organize the work of artists, find and make administrative decisions in the field of organization and regulation of labor</p>	Know	<ul style="list-style-type: none"> –common approaches organization of the performers; –principles and methods of organization of workplaces, their technical equipment, installation of processing equipment; –the basic concepts of the organization of labor; labor norms
	able to	<ul style="list-style-type: none"> –organize the work of artists, find and make administrative decisions in the field of organization and regulation of labor
	own	<ul style="list-style-type: none"> –skills to organizing the work of performers; –skills workplace organization, their technical equipment, process equipment; –management decision-making skills in the organization and regulation of labor
<p>PC-6 readiness for the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards</p>	Know	<ul style="list-style-type: none"> –general provisions and medical-biological requirements for the quality of biotechnology products; –the main directions of the state policy in the field of biomedical cell products; –the main directions of technological advances in the medical and pharmaceutical biotechnology, development of new biotechnology and biomedical cell products
	able to	<ul style="list-style-type: none"> –use and meets the requirements of Russian and international quality standards; –support the modernization and optimization of existing production processes based on a systematic approach to the analysis of quality of raw materials, the process and requirements of the final product; –issue documentation and implement the quality management system
	own	<ul style="list-style-type: none"> –norms and requirements of medical, biotechnological sciences, quality and cost, safety and environmental performance to create a biomedical cell products; –the methods and principles of quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards; –the basic principles of state policy in the field of

		biomedical cell technologies
PC-7 ability to organize and summarize the information on the formation and use of resources of the enterprise	Know	<ul style="list-style-type: none"> –the structure of technological solutions and their adjustment during the industrial testing of advanced biotechnology and new biotechnological products with a view to optimizing costs and improving product quality; –composition of production and non-operating expenses and modernized production of biotechnology products; –performance indicators of technological processes of production of biotechnology products; –Methods and means of collecting, processing, storage, transmission and storage information using the basic system software and application software packages in the production of biotechnological products; –resource support biotechnological production
	able to	<ul style="list-style-type: none"> –apply the method of calculation of technical and economic efficiency of the production of biotechnological products in the selection of optimal technical and organizational solutions; –use technologies for collecting, loading, storage, storage, conversion and transmission of data in a professional-oriented information systems biotechnological production
	own	<ul style="list-style-type: none"> –design changes to the technical and technological documentation for adjusting technological processes, control systems, production of biotechnology products; –preparation of proposals to improve the efficiency of production and competitiveness of products aimed at the rational use and reduce consumption of raw materials, reduce the labor intensity of production, increase productivity, economical use of energy resources in the enterprise, the introduction of non-waste and low-waste technologies biotechnological production

A special feature in the design and content of the course is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming"), software and hardware, fund teaching, evaluation and electronic means of discipline.

Course syllabus
"Quality and safety of biotech products "in the profile educational
program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.05.01 "Quality and safety of biotech products" is written for professional education on the profile of the program "Molecular Biotechnology" 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" composed for the professional educational program on a structure for ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

Subject B1.V.DV.05.01 "Quality and safety of biotech products" is included in the variable component of disciplines at the choice of the educational program for undergraduate profile "Molecular Biotechnology" areas of training 03.19.01 Biotechnology.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours), laboratory exercises (18 hours) and practical classes (seminars) (18 hours), independent work of students (90 hours). Subject is implemented on 4 course 8 semester.

Mastering discipline is parallel and closely related with the study subjects "Pharmaceutical Biotechnology," "Medical Biotechnology", "Applied Microbiology", "Marine Biotechnology".

Assessment of learning outcomes: Exam.

The discipline is aimed at creating an appropriate level of study quality management principles of quality management and safety of organic products.

goal studying the discipline: to form knowledge of the system representation of quality and safety of biotech products, methods of their assessment and support, the ability to solve basic problems of optimization of technological processes.

Tasks:

- 1) familiarity with the basic directions of the state policy in the field of biomedical cell products;
- 2) study of the concepts and principles of quality management and safety of biotechnology products, practical models of their application in the activity of the enterprises (organizations);

3) study of medical and biological requirements for the quality of biotechnology products;

4) study of the basic tools of quality management and safety of biomedical cell products;

5) study of quality and safety models in accordance with the requirements of Good Clinical Practice GCP, Good Laboratory Practice GLP and GMP good manufacturing practices;

6) acquisition of skills development documents containing a list of indicators of quality biomedical cell product, depending on results of relevant expertise and information on the methods of quality control of biomedical cell product.

For successful study of discipline "Quality and safety of biotech products" in students the following preliminary competences should be formed:

–the ability to use modern methods and technologies (including information) in their professional activities;

–the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technologies.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GCC12 the ability to use the foundations of legal knowledge in various fields	Know	–system of normative legal acts of the Russian Federation; –the foundations of legal knowledge in various fields
	able to	–use regulations in its operations; –use the basics of legal knowledge in various fields
	own	–proficiency in the use of regulatory legal acts in different spheres of life; –the basics of legal knowledge in various fields
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters biotechnological processes, properties of raw materials and products	Know	–technology and basic technological operations and modes of operation of process equipment for the production of biotechnology products; –rules of the organization and management of the technological process in the manufacture of biotechnology products; –methods to control the main parameters of biotechnological processes, properties of raw materials and products
	able to	–maintain basic technological processes of production

		<p>biotechnology products;</p> <ul style="list-style-type: none"> –adjust processes production of products of biosynthesis indications instrumentation and analyzes based on the determination of process parameters biosynthetic production processes of products; –use methods –quality control of technological operations of production of biotechnological products
	own	<ul style="list-style-type: none"> –ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, properties of raw materials and products; –the skills of the biotechnological process of research on experimental and pilot plant
PC-6 readiness for the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards	Know	<ul style="list-style-type: none"> –general provisions and medical-biological requirements for the quality of biotechnology products; –the main directions of the state policy in the field of biomedical cell products; –the main directions of technological advances in the medical and pharmaceutical biotechnology, development of new biotechnology and biomedical cell products
	able to	<ul style="list-style-type: none"> –use and meets the requirements of Russian and international quality standards; –use of advanced domestic and foreign experience in the field of progressive –production technology of new biotechnology and biomedical cell products; –improve and streamline current processes on the basis of a systematic approach to the analysis of quality of raw materials, production process and end product requirements
	own	<ul style="list-style-type: none"> –norms and requirements of medical, biotechnological science, quality and cost, safety and environmental performance to create a biomedical cell products; –methods and principles of the Quality Management System for Biotechnology –products in accordance with the requirements of Russian and international quality standards; –the basic principles of state policy in the field of biomedical cell technologies
PC-10	Know	<ul style="list-style-type: none"> –foundations and principles of standardization, the

the ability to conduct standard and certification tests of raw materials, finished products and production processes		<p>process of production preparation for the conformity assessment procedures;</p> <ul style="list-style-type: none"> –operating in the industry and enterprise standards and technical regulations, legislation and regulations; –existing state certification and product certification system; –Standard techniques of raw materials testing, finished biotechnological products and processes; –the quality management system of production processes and finished products of biotechnological
	able to	<ul style="list-style-type: none"> –current production process information, perform data analysis for use in managing and ensuring the quality and safety of biotechnology products; –conduct standard and certification testing of raw materials, finished products and production processes
	own	<ul style="list-style-type: none"> –methods of establishing an effective system of quality control of raw materials, semi-finished and finished biotechnological products; –standard methods and certification testing of raw materials, finished products and production processes
PC-19 willingness to participate in the development of design and working of technical documentation	Know	–regulatory requirements for the design of biotechnological production
	able to	–to develop normative and technical documentation on the results of the introduction of technological processes and control systems of advanced technologies biotechnological production
	own	<ul style="list-style-type: none"> –main types of normative and technical documentation is issued as a result of the introduction of technological processes and control systems of advanced production technology of biotechnology products; –regulations specifying the requirements for the design of enterprises for the production of biotechnology products; –The principle of the development of design and working of technical documentation

For the formation of the above competencies in the discipline "Quality and safety of biotech products", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"Methods of control and certification of biotech products "
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.05.02 "Methods of control and certification of biotech products" is written for professional educational program on a profile "Molecular Biotechnology" 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" composed for the professional educational program on a structure for ongoing major professional educational programs towards the preparation 19.03.01 Biotechnology.

Subject B1.V.DV.05.02 "control and biotechnological products certification methods" included in the elective component of disciplines at the choice of the educational program for undergraduate profile "Molecular Biotechnology" areas of training 03.19.01 Biotechnology.

The total complexity of the development of the discipline of 4 credits, 144 hours. Curriculum provides lectures (18 hours), laboratory exercises (18 hours) and practical classes (seminars) (18 hours), independent work of students (90 hours). Subject is implemented on 4 course 8 semester.

Mastering discipline is parallel and closely related with the study subjects "Pharmaceutical Biotechnology," "Medical Biotechnology", "Applied Microbiology", "Marine Biotechnology".

Assessment of learning outcomes: Exam.

The discipline is aimed at creating an appropriate level of study quality management principles of quality management and safety of organic products.

goal of the studying the discipline: to generate knowledge about the system representation methods of control and certification of biotechnological products, methods of their assessment and support, the ability to solve basic problems of optimization of technological processes.

Tasks:

1) study of methods and principles of the input raw material quality control, process control, and semi process parameters ready biotechnological products;

2) study of scientific and technical information, domestic and foreign experience in the production of biotechnological products;

3) study of methods and principles of the organization of effective quality control systems of raw materials, semi-finished and finished biotechnology products based on standard and certification tests;

4) mastering methods of processing the current production data, analyzing the received data for use in preparation for product certification;

5) acquisition of skills development documents containing a list of indicators of quality biomedical cell product, depending on results of relevant expertise and information on the methods of quality control of biomedical cell product;

6) the acquisition of skills the organization preclinical biomedical cell product;

7) the acquisition of skills training of biotechnological products to the state registration of biomedical cell products;

8) study schemes of biomedical and ethical review of biomedical cell product;

9) study schemes of the quality of the examination, the effectiveness ratio of the expected benefits to the possible risk of the application of biomedical cell product.

For successful study of discipline "Quality and safety of biotech products" in students the following preliminary competences should be formed:

–the ability to use modern methods and technologies (including information) in their professional activities;

–the ability to search, store, process and analyze information from various sources and databases, to represent it in the desired format using the information, computer and network technologies.

As a result of studying this discipline in students formed following general professional (GPC) and professional (PC) competence:

Code and the wording of competence	Stages of formation of competence	
GCC12 the ability to use the foundations of legal knowledge in various fields	Know	–system of normative legal acts of the Russian Federation; –the foundations of legal knowledge in various fields
	able to	–use regulations in its operations; –use the basics of legal knowledge in various fields
	own	–proficiency in the use of regulatory legal acts in different spheres of life; –the basics of legal knowledge in various fields
PC-1 ability to perform process in compliance	Know	–technology and basic technological operations and modes of operation of process equipment for the production of biotechnology products;

with the regulations and the use of technical means for measuring the basic parameters biotechnological processes, properties of raw materials and products		<ul style="list-style-type: none"> –rules of the organization and management of the technological process in the manufacture of biotechnology products; –methods to control the main parameters of biotechnological processes, properties of raw materials and products
	able to	<ul style="list-style-type: none"> –maintain basic technological processes of production biotechnology products; –adjust processes production of products of biosynthesis indications instrumentation and analyzes based on the determination of process parameters biosynthetic production processes of products; –use methods –quality control of technological operations of production of biotechnological products
	own	<ul style="list-style-type: none"> –ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, properties of raw materials and products; –the skills of the biotechnological process of research on experimental and pilot plant
PC-6 readiness for the implementation of the quality management system of biotechnological products in accordance with the requirements of Russian and international quality standards	Know	<ul style="list-style-type: none"> –general provisions and medical-biological requirements for the quality of biotechnology products; –the main directions of the state policy in the field of biomedical cell products; –the main directions of technological advances in the medical and pharmaceutical biotechnology, development of new biotechnology and biomedical cell products
	able to	<ul style="list-style-type: none"> –use and meets the requirements of Russian and international quality standards; –use of advanced domestic and foreign experience in the field of progressive –production technology of new biotechnology and biomedical cell products; –improve and streamline current processes on the basis of a systematic approach to the analysis of quality of raw materials, production process and end product requirements
	own	<ul style="list-style-type: none"> –norms and requirements of medical, biotechnological science, quality and cost, safety and environmental performance to create a biomedical cell products;

		<ul style="list-style-type: none"> –methods and principles of the Quality Management System for Biotechnology –products in accordance with the requirements of Russian and international quality standards; –the basic principles of state policy in the field of biomedical cell technologies
PC-10 the ability to conduct standard and certification tests of raw materials, finished products and production processes	Know	<ul style="list-style-type: none"> –foundations and principles of standardization, the process of production preparation for the conformity assessment procedures; –operating in the industry and –enterprise standards and technical regulations, legislation and regulations; –existing state certification and product certification system; –Standard techniques of raw materials testing, finished biotechnological products and processes; –the quality management system of production processes and finished products of biotechnological
	able to	<ul style="list-style-type: none"> –current production process information, perform data analysis for use in managing and ensuring the quality and safety of biotechnology products; –conduct standard and certification testing of raw materials, finished products and production processes
	own	<ul style="list-style-type: none"> –methods of establishing an effective system of quality control of raw materials, semi-finished and finished biotechnological products; –standard methods and certification testing of raw materials, finished products and production processes
PC-19 willingness to participate in the development of design and working of technical documentation	Know	<ul style="list-style-type: none"> –regulatory requirements for the design of biotechnological production
	able to	<ul style="list-style-type: none"> –to develop normative and technical documentation on the results of the introduction of technological processes and control systems of advanced technologies biotechnological production
	own	<ul style="list-style-type: none"> –main types of normative and technical documentation is issued as a result of the introduction of technological processes and control systems of advanced production technology of biotechnology products; –regulations specifying the requirements for the design of production enterprises –biotechnology products; –The principle of the development of design and working of technical documentation

For the formation of the above competencies in the discipline "Methods of control and certification of biotech products", the following methods of active / interactive learning: seminars in the form of "round tables"; discussion, problem method, experimental workshops.

Course syllabus
"Biotechnology of aquaculture"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

Course syllabus B1.V.DV.06.01 "Aquaculture Biotechnology" drawn up for the professional educational program on a profile "Molecular Biotechnology" in accordance with the "Far Eastern Federal University," the requirements of the educational standard, independently establishes a federal state autonomous educational institution of higher education for the ongoing major vocational education programs in the undergraduate program 19.03.01 Biotechnology.

Subject "Biotechnology of aquaculture" is realized in 8 semesters 4 courses of the educational program. The total complexity of development disciplines transcripts is 6 units (216 hours). Curriculum provides lecture (36 h.), Practical exercises (36 h.), Laboratory exercises (36 h.), Independent work (72 hours, including exam preparation 36 hours).

Contents B1.V.DV.06.01 "aquaculture Biotechnology" discipline encompasses knowledge in the field of aquaculture, the hydrosphere Bioecology, materials science, bioremediation, molecular genetics, genomics and bioinformatics. During the training the student will be developed methods to identify different groups of aquatic organisms and methods of their content in artificial conditions, estimation methods of their physiological status, particularly techniques for working with the cells and molecules of these organisms.

Requirements for the "input" knowledge, skills and readiness to train required during the development of this discipline, meet the requirements obtained in the course of development of the previous disciplines: "Biology", "Physiology of the basics of anatomy," "Molecular and Cellular Biology", "General Biology microbiology ", " biochemistry ", "Bioorganic chemistry", " Cell Biomedical Technologies ", " Fundamentals of Biotechnology ", " Industrial Microbiology and Biotechnology ", " Pharmaceutical Biotechnology "" The processes and apparatus of biotechnology. " For successful study of discipline "Aquaculture Biotechnology" among students following preliminary competences should be formed:

– the ability to self-improvement and self-development in the professional field, to improve the cultural level (OC-1);

- readiness to integrate into the scientific, educational, economic, political and cultural space of Russia and the Asia-Pacific region (GCC2);
- ability to take initiative and to make responsible decisions, aware of the responsibility for the results of their professional activity (GCC3);
- the ability to use modern methods and technologies (including information) in a professional activity (GPC5);
- the ability and willingness to use the basic laws of natural sciences in professional work, to apply the methods of mathematical analysis and modeling, theoretical and experimental research (GPC-2).

The purpose of the development of the discipline Students acquire knowledge about modern biotechnology application aquatic organisms, as well as practical skills of experimental research in the field of cell and molecular gidrobiotekhnologii and aquaculture.

Tasks:

- 8) to provide a basic understanding of the aquatic ecosystem;
- 9) to study the ecology, biology and biodiversity of aquatic organisms;
- 10) understand the molecular structure, genetics, cell organization and evolutionary processes aquatic organisms;
- 11) know and understand the basic facts and concepts related to hydrobiotechnology ;
- 12) Know aquatic of interest to biotechnology, and their key features and role in the ecosystem.
- 13) to know and apply the methodology of biotechnology to the aquatic environment and its inhabitants;
- 14) gain knowledge about biotechnology company engaged in breeding, processing and yield the expected raw aquatic organisms.

As a result of studying this discipline in students formed general professional, occupational and universal competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC5	Know	<ul style="list-style-type: none"> – modern methods and technology (including information) the development of new trends in aquaculture biotechnology; – the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in aquaculture biotechnology; – How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> – the use of modern methods and technologies

		<p>(including information) in aquaculture biotechnology;</p> <ul style="list-style-type: none"> – use the software for professional applications; – used services and information resources of the Internet in aquaculture biotechnology
	own	<ul style="list-style-type: none"> –Modern methods and technologies (including information) in aquaculture biotechnology; –basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-temporal patterns, the structure of matter to understand the surrounding world and natural phenomena	Know	<ul style="list-style-type: none"> –manifestations of the fundamental properties of a living at different levels of organization; –physical, chemical, physicochemical and biological processes in the aquatic ecosystem; –a variety of marine and freshwater organisms of interest for biotechnology
	able to	–plan, conduct an experiment and analyze the results
	own	–skills with a specialized scientific literature for professional applications
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	Know	–Technical means and methods for measuring the basic parameters of biotechnological processes, the properties of raw materials and products
	able to	<ul style="list-style-type: none"> –exercise process in accordance with the rules; –select a rational scheme biotechnological production of the desired product; –apply biotechnology to the methodology of the aquatic ecosystem for professional applications
	own	<ul style="list-style-type: none"> –main methods of experimental and theoretical research in the field of aquatic biotechnology; –main types of biotechnological process control systems
PC-2 capacity for implementation and management of biotechnological processes	Know	<ul style="list-style-type: none"> –basic production scheme based on a process of bioconversion of living aquatic resources; –Safety requirements and operation of technological equipment protection
	able to	<ul style="list-style-type: none"> –make the concept of biotechnological production with the use of raw materials of marine and freshwater origin; –optimize biotechnological processes and schemes
	own	<ul style="list-style-type: none"> –software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes;

		–Knowledge for the commercialization of biotechnological production
PC-17 the ability to develop the basic stages of biotechnological process	Know	–key stage biotechnological production of various categories of marine raw materials.
	able to	–plan biotechnological process to obtain the desired product
	own	–methods of cell and molecular biotechnology gidrobiontov
UC-8 obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation	Know	–patterns of growth of marine and freshwater producing biotechnologically important objects; –ways of intensification of traditional biotechnologies
	able to	–make the concept of biotechnological production; –biological objects to create new methods of cell and genetic engineering
	own	–methods of calculating the basic parameters of biotechnological equipment; –methods of regulating the biosynthesis of primary and secondary metabolites

A special feature in the design and content of the course "Aquaculture Biotechnology" is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming "), software and hardware, fund teaching, evaluation and electronic means of discipline.

Course syllabus
"Agri-food biotechnology"
educational program
"Molecular Biotechnology"
branch of undergraduate program
19.03.01 Biotechnology

The total complexity of development disciplines transcripts is 6 units (216 hours). Curriculum provides lecture (36 h.), Practical exercises (36 h.), Laboratory exercises (36 h.), Independent work (72 hours, including exam preparation 36 hours).

As a result of studying this discipline in students formed general professional, occupational and universal competence (competency elements):

Code and the wording of competence	Stages of formation of competence	
GPC5	Know	<ul style="list-style-type: none"> – modern methods and technology (including information) the development of new trends in the agri-food biotechnology; – the importance and role of information and information technologies in the development of modern society and economic knowledge, methods of using information and communication technologies in the agri-food biotechnology; – How to enter and edit data in the automation system
	able to	<ul style="list-style-type: none"> – the use of modern methods and technologies (including information) in molecular biotechnology; – use the software for professional applications; – use the services and information resources of the Internet in the agri-food biotechnology
	own	<ul style="list-style-type: none"> – Modern methods and technologies (including information) in the agri-food biotechnology; – basic techniques, methods and means of receiving, storing, processing information; computer skills as an information management tool
GPC 3 the ability to apply knowledge of modern physical picture of the world, the space-	Know	<ul style="list-style-type: none"> – manifestations of the fundamental properties of a living at different levels of organization; – physical, chemical, physicochemical and biological processes in the aquatic ecosystem; – a variety of marine and freshwater organisms of

temporal patterns, the structure of matter to understand the surrounding world and natural phenomena		interest to the agro-food biotechnology
	able to	–plan, conduct an experiment and analyze the results
	own	–skills with a specialized scientific literature for professional applications
PC-1 ability to perform process in compliance with the regulations and the use of technical means for measuring the basic parameters of biotechnological processes, raw materials and properties of the products	Know	–Technical means and methods for measuring the basic parameters of biotechnological processes, the properties of raw materials and products
	able to	–exercise process in accordance with the rules; –select a rational scheme biotechnological production of the desired product; –apply biotechnology to the methodology of the ecosystem for professional applications
	own	–main methods of experimental and theoretical research in the field of agri-food biotechnology; –main types of biotechnological process control systems
PC-2 capacity for implementation and management of biotechnological processes	Know	–basic production scheme based on a process of bioconversion of living aquatic resources; –Safety requirements and operation of technological equipment protection
	able to	–make the concept using biotechnological production of vegetable and animal raw materials; –optimize biotechnological processes and schemes
	own	–software used for biotechnological production; –methods of calculating the basic parameters of biotechnological processes; –Knowledge for the commercialization of biotechnological production
PC-3 willingness to assess the technical means and technologies, taking into account the environmental consequences of their application	Know	–basic methods of protection of industrial workers and the public from the possible consequences of accidents, catastrophes and natural disasters; means and methods to improve the safety of technical devices and technological processes
	able to	–protect production personnel and people from the possible consequences of accidents, catastrophes, natural disasters carry out the control parameters of air, noise, vibration, electromagnetic, thermal radiation
	own	–skills to protect industrial workers and the public from the possible consequences of accidents, catastrophes, natural disasters

UC-8 obtaining ownership principles, research and application of enzymes, viruses, microorganisms, cell cultures, plants and animals, products of biosynthesis and biotransformation	Know	<ul style="list-style-type: none"> –patterns of growth of marine and freshwater producing biotechnologically important objects; –ways of intensification of traditional agri-food biotechnology
	able to	<ul style="list-style-type: none"> –make the concept of biotechnological production; –biological objects to create new methods of cell and genetic engineering
	own	<ul style="list-style-type: none"> –methods of calculating the basic parameters of biotechnological equipment; –methods of regulating the biosynthesis of primary and secondary metabolites

A special feature in the design and content of the course "agri-food biotechnology" is the use of active / interactive learning methods (lecture-visualization, lecture-discussion, colloquium-debate, colloquium, a press conference, the method of situational problems («case study»), the method of "brainstorming "), software and hardware, fund teaching, evaluation and electronic means of discipline.