

Abstract (general description for the basic professional higher education program MSc in Molecular and Cell Biology, area of studies: 06.04.01, Biology

basic vocational education program

"Molecular and Cell Biology" / "Molecular and Cellular Biology"

in the direction of preparation 06.04.01 Biology

Qualification – Master of Science (MSc)

Standard term of study - 2 years

Volume - 120 units.

## **1. General Terms**

The basic professional education program (BPEP) of the MSc level, implemented by the Federal State Autonomous Educational Institution of Higher Education "Far Eastern Federal University" (FEFU) in the direction of training 06.04.01 Biology, the MSc program "Molecular and Cellular Biology" is a systematic documentation developed and approved by the higher education institution taking into account the requirements of the labor market based on the education standard of higher education, independently set by FEFU.

BPEP is a summary of the main education characteristics (volume, content, expected results),

organizational and pedagogical conditions, forms of certification, which are presented in the form of annotations (general characteristics) of the educational program, curriculum, calendar study schedule, work programs of disciplines (modules), practical programs, education and methodology contents for the discipline, including assessment tools and teaching materials, research programs and final degree certification, as well as information about the existing resources to support the education process.

In accordance with the selected activities and requirements on the outcomes of the current education program, this BPEP is a program of academic degree of the MSc level.

## **2. Regulatory framework for the development of BPEP**

Regulatory legal framework for the development of BPEP are:

- Federal Law of December 29, 2012 No. 273-ФЗ “On Education in the Russian Federation”;
- regulatory documents of the Ministry of Education and Science of the Russian Federation, the Federal Service for Supervision in Education and Science;
- The Charter of FEFU, approved by order of the Ministry of Education and Science of the Russian Federation of December 28, 2018 No. 1360;
- local FEFU regulations and documents.

## **3. Goals and objectives of the main educational program**

In accordance with the recommendations of the Ministry of Education and Science of the Russian Federation and the requirements of the Education Standards for Higher Education (ESHE), FEFU, area of studies 06.04.01 Biology, the main goal of the education program is:

- high-quality training of highly qualified personnel in the field of "Biological Sciences" for research, design, organizational, managerial, and industrial-technological professional activities through mastering the profile of the program by students and mastering general cultural, general professional and professional competences that contribute to the social mobility of graduates and their sustainability in the job market.

The main goal is achieved by solving the following tasks:

- ensuring the system of quality training in this area and the implementation of ESHE, taking into account the development of science, culture, economics, technology, technology and the social demands;

- ensuring the systemic interaction of the faculty with employers, including the business community for the development of general cultural, professional, social, and personal competences and the assessment of the graduate training quality;

- establishing and developing of the professional knowledge among students, including the complete set of skills and abilities in accordance with the requirements of the OSHE in this area of training;

- improving the knowledge of a foreign language according to the demands of their professional activities;

- improvement of philosophy education, as per requirement of the professional area;

- in-depth learning of the theoretical and methodological foundations of molecular and cellular biology, e.g. methods for studying the structure and properties of biomacromolecules, methods for studying the morphology and functions of cells and tissues, methods for molecular modeling, methods and resources of bioinformatics, modern approaches to synthetic biology and genetic engineering, studying the structure and functioning of genomes organisms, methods of cell and tissue bioengineering;

- obtaining knowledge in the field of legislative base of development and practical application of molecular and cellular technologies, practical application of modern achievements of molecular and cellular biology in the field of healthcare, medical, and pharmaceutical industry, including such the view of the law “180-Φ3” “On biomedical cell products”;

- formation of skills for conducting independent research and teaching activities;

- formation of skills for solving of such professional tasks as: the development of technical specifications for the design and manufacture of non-standard equipment and facilities of technological equipment of enterprises; development of technical documentation and technical regulations; organization of product quality control in accordance with the requirements of sanitary, veterinary norms and rules; organization of monitoring compliance with environmental safety of production processes; development of new types of products and technologies in accordance with the state policy of the Russian Federation in the field of healthy nutrition of the population based on scientific research; participation in the preparation of design and technological documentation taking into account the international experience; organization and conduct of research in the field of biotechnology.

#### **4. The complexity of BPEP in the direction of training**

The volume of the Master's program “Molecular and Cellular Biology” , subject area 06.04.01, Biology, is 120 credit units (60 credit units per year) for a standard training period of 2 years, regardless of the form of education, the applied educational technologies, the implementation of the MSc program using the network form , the implementation of the MSc program according to the individual curriculum, including the accelerated learning.

The implementation of the MSc program includes e-learning and distance learning technologies. When teaching persons with disabilities, e-learning and distance learning technologies should have capacities for the exchange of the

information acceptable to such persons. The implementation of the MSc program is possible using the network form.

## **5. Field of professional activity**

The field of professional activity of the current MSc program graduates includes the study of wildlife and related laws, the use of biological systems for economic and medical purposes, and the nature protection.

## **6. Objects of professional activity**

The objects of professional activity of graduates who have mastered the master's program are:

- biological systems of various organization levels;
- biological processes and evolution;
- biological, bioengineering, biomedical, environmental protection technologies, biological expertise and monitoring, evaluation and restoration of territorial bioresources.

## **7. Types of professional activity. Professional tasks**

MSc degree in subject area 06.04.0, Biology "Molecular and Cellular Biology" is preparing listeners for the following professional activities:

- conducting research;
- research and development activities

*Tasks of the graduate's professional activity:*

*Research activities:*

- independent selection and justification of the goal, organization, and conduct of scientific research in accordance with the subject areas of the MSc program;
- formulation of new tasks arising during the study;
- selection, justification, and development of methods that are adequate to the goal;
- development of new theories, models, research methods, the development of new methodological approaches;
- work with scientific information using new technologies;
- processing and critical evaluation of research results;

- preparation and execution of scientific publications, reports, patents, reports, seminars, and conferences.

*Research and production activities:*

- independent planning and carrying out of field, laboratory and applied work, control of biotechnological processes in accordance with the subject areas of the MSc program;

- development and participation in the creation of new biological and biomedical technologies;

- organization of the collection of the biological material;

- planning and carrying out environmental protection measures;

- planning and conducting biomonitoring and assessment of the state of the environment;

- restoration and cultivation of bioresources;

- collection and analysis of the available information on the problem using modern automated methods;

- processing and critical analysis of the data;

- preparation and publication of reviews, patents, and articles.

## **8. Requirements for the results of the development of BPEP**

As a result of attending of the MSc program, graduates form general cultural, both general and unique professional competencies that are developed taking into account the specificity of BPEP for specific areas of knowledge and activities.

A graduate who has completed the MSc program should have following general cultural competencies (CC):

- ability to abstract thinking, analysis, synthesis (CC-1);

- readiness to act in non-standard situations, to bear social and ethical responsibility for the decisions made (CC-2);

- readiness for self-development, self-realization, and use of creative potential (CC-3).

A graduate who has completed the MSc program should have the following general professional competencies (PC):

- readiness for communication in oral and written forms in the state language of the Russian Federation and in a foreign language for solving problems related to the professional activity (PC-1);

- readiness to lead the team to conduct professional activities, tolerantly perceiving social, ethnic, confessional, and cultural differences (PC-2);
- readiness to use fundamental biological knowledge in the field of professional activity for setting new scientific questions and answering them (PC-3);
- the ability to independently analyze available information, identify fundamental problems, set tasks and carry out both field and laboratory biological research to solve specific problems using modern equipment and computational tools; responsibility for the quality of work and scientific accuracy of results (PC-4);
- the ability to apply knowledge of the history and methodology of biological sciences for solving fundamental professional problems (PC-5);
- the ability to use the knowledge of the biosphere processes for the systematic evaluation of geopolitical phenomena and the prediction of the consequences - the implementation - of socially significant projects (PC-6);
- readiness to creatively apply modern computer technologies in collecting, storing, processing, analyzing and transmitting biological information to solve professional problems (PC-7);
- the ability to use philosophical concepts of natural science for the formation of a scientific worldview (PC-8);
- the ability to professionally draw up, submit and report the results of research and production and technological works in accordance with approved forms (PC-9).

A graduate who has completed the MSc program should have professional competencies (PC) corresponding to the following types of professional activity:

- readiness to creatively use scientific and technological knowledge linked to both fundamental and applied sections of the related disciplines (modules) that determine the direction of the graduate program (PC-1);
- ability to plan and implement professional activities (in accordance with the area of the graduate program) (PC-2);
- the ability to apply the methodological foundations to design both field and laboratory biological and environmental research, use modern equipment and computing systems (in accordance with the subject areas of the Master's program) (PC-3);
- the ability to generate new ideas and methodological solutions (PC-4);

*research and production activities:*

- readiness to use knowledge of regulatory documents governing the organization of biological research and production (in accordance with the orientation (profile) of the MSc program) (PC-5)
- the ability to lead the team, ensuring the necessary measures of industrial safety (PC-6).

## **9. Characteristics of the educational environment of FEFU, ensuring the formation of general cultural competencies and the achievement of educational goals**

In accordance with the FEFU Charter and the University Development Program, the main task of educational work with undergraduates is to create conditions for students' active life, for civil self-determination and self-realization, for meeting the needs of students for intellectual, spiritual, cultural, and moral development. Educational activities of the university are carried out systematically through the educational process, practices, research work of students, and extracurricular activities in all areas. The university has a campus environment that ensures the development of general personal, cultural, and social competencies of the graduates.

The organization and content of the management system of educational and extracurricular activities in FEFU are provided by the following structures:

- academic council;
- rectorate;
- office of the vice-rector for educational and educational work;
- services of psychological and pedagogical support;
- schools;
- department of extracurricular activities;
- creative center;
- joint student council.

Young people can apply their strengths and realize their own potential at the Volunteer Training Center, the Parliamentary Debate Club, the Students Union, the United Student Scientific Society, and Russian student teams. The educational environment of the university benefits from the fact that each student has the opportunity to be active, included in social practice, and solving problems of the university, city, country, and the world at large, while developing relevant general cultural and professional competences. So to support and motivate students in FEFU, a number of governmental and non-governmental scholarships are defined:

scholarship for success in research, scholarship for success in social activities, scholarship for success in sports activities, scholarship for success in creative activities, Scholarship of the V. Potanin Charitable Foundation, Scholarship of the Oxford Russian Foundation, Scholarship of the Governor of Primorsky Krai, Scholarship "Genzo Shimadzu" , BP Scholarship, Alpha Chance Scholarship Program, Mitsubishi Corporation International Scholarship, etc.

The conditions associated with application to these fellowships are determined by the Regulations of Scholarships and other forms of material support in FEFU approved by Act 12-13-2063 in November 13, 2018.

The selection criteria and the amounts of academic scholarships are governed by the Regulation of higher education state academic scholarships for achievements in educational, research, public, cultural, creative and sports activities, approved by Act 12-13-1296 in 09.07.2018.

The procedure for assigning material assistance to needy students is governed by the Regulations on the procedure for providing one-time financial assistance to FEFU students, approved by order No. 12-18-1069 of 04.06.2018, and the amount of payments is determined by the FEFU Financial Assistance Commission.

In addition, to support talented FEFU students, there is a program to support academic mobility of students and graduate students - a system of financing travel to events - academic conferences, internships, seminars, meetings, and summer schools.

Within the framework of the implementation of the Program for the Development of Student Associations, financial support is provided to the activities of student associations, student groups, student self-government, the volunteer movement, the development of interest clubs, support for student sports, and patriotic direction.

The University is a unique complex of buildings and structures located on an area of about a million square meters, with a developed campus infrastructure, including hostels and hotels, sports facilities and facilities, a medical center, a network of canteens and cafes, gyms, grocery stores, pharmacies, post offices and banks, laundries, studios and other facilities that provide all the conditions for living, catering, recreation, and sports for students and staff. All campus buildings are designed for accessibility for people with disabilities. For the organization of independent work of students, premises and computer classes are equipped with possible access to the Internet and the electronic educational environment of the university. As part of the development of the campus infrastructure, the Ajax cultural and leisure space project has been implemented, which includes the following areas: co-working, exhibitions, cafés, etc.



## 9. Specific features of BPEP

The training of specialists in the field of molecular and cell biology is an urgent task of higher education, since fundamental knowledge in this field of natural science is crucial for the further development of theoretical and experimental biology, biotechnology and medicine.

The future of medicine today is strongly associated with the development of cellular technologies, so the labor market requires highly qualified specialists to manage modern medical institutions with the necessary set of professional competencies in research, production, and project management.

Disciplines of the direction 06.04.01 Biology Master's program "Molecular and Cellular Biology", such as "Modern problems of biomedicine", "Molecular and cellular mechanisms of carcinogenesis", "Comparative histology", "Human histology", "Reproduction and differentiation of cells", "Human Neurobiology", "Pathological Histology", etc., aimed at forming a deeper understanding of the structural and functional organization of prokaryotic and eukaryotic cells and tissues, the structural and functional organization and regulation of genome expression, mechanisms of autoregulation and adaptation of cells, proliferation and differentiation, integration of cells in various organisms, cell-cell interactions; in the regional clinical center of specialized types of medical care; in all research institutes of the Russian Academy of Sciences; private medical clinics, IVF centers; modern clinics using cellular technology; medical diagnostic centers; research and testing laboratories of industrial enterprises.

During the training, undergraduates will become familiar with the problems of tumor growth, master the methods of light and electron microscopy, the cultivation of cells and tissues, the isolation and study of subcellular structures, analysis of metabolic processes, immunochemistry, and other methods of cell biology. The educational program involves undergraduate research in the semester and writing a master's thesis.

The implementation of the action plan ("roadmap") "Development of biotechnologies and genetic engineering" (hereinafter referred to as the "roadmap") is carried out both with the help of global assessment of the development of the biotechnology industry and measures for the development of priority sectors in this area, including following:

- biopharmaceuticals;
- biomedicine;
- industrial biotechnology;
- bioenergy;
- agri-food biotechnology;

- forest biotechnology;
- environmental (ecological) biotechnology.

Guided by the Federal Target Program “Development of the pharmaceutical and medical industry of the Russian Federation for the period up to 2020 and beyond” and the Order of the Government of the Russian Federation No. 1247-p, dated July 18, 2013, “On Approving an Action Plan (Road Map)” on Developing Biotechnology and Genetic Engineering ", Relevant events are:

- on improving the quality of training, advanced training and professional retraining for biotechnology (paragraph 6 of plan No. 1247-p);
- on the formation of a list of professional standards most in demand in the field of biotechnology (paragraph 7 of plan number 1247-p);
- on the development of professional standards in the field of biotechnology (paragraph 8 of plan No. 1247-p);
- on the development of proposals to stimulate demand for domestic innovative medicines, including biotechnology-based (paragraph 23 of Plan No. 1247-p);
- on the development of a draft Good Practice for the Production of Biomedical Cellular Products (p. 32 of Plan No. 1247-p);
- on the creation of GLP-certified cell laboratories, allowing to accurately characterize and standardize cell lines and products derived from them (section 33 of plan No. 1247-p) laboratories that accurately characterize and standardize cell lines and products derived from them (section 33 of plan No. 1247-p);

According to the Department of Health, the Department of Education and Science, the Department of Fisheries and Aquatic Biological Resources of the Primorsky Territory Administration in the region) and the current areas of activity of the biotech industry is very high.

The main current activities of the industry in Primorsky Krai:

- 1) creation of a biotechnological cluster in accordance with the roadmap;
- 2) the introduction of technical regiment of the trade union with special requirements for the qualification of personnel;
- 3) construction of processing facilities and biotechnological modules;

The relevance of the basic professional educational program "Molecular and Cellular Biology" in the direction of 06.04.01 Biology is to prepare graduates who are ready to perform professional tasks taking into account modern requirements for the development of biology and biotechnology in such interdisciplinary areas

of research as, system biology, marine biology, cell technologies, molecular biotechnology, molecular and cellular biology of marine organisms, biotechnology of aquatic biological resources.

The main professional educational program "Molecular and Cellular Biology" in the direction of training 06.04.01 Biology is focused on those activities that are basic for the development of high-tech production and scientific and technological potential in the field of biotechnology, system biology, cell technology, molecular biotechnology, aquatic biotechnology biological resources.

Professional competencies, as well as the established activities and professional tasks meet the requirements of the Comprehensive Biotechnology Development Program in the Russian Federation for the period up to 2020, as they allow to effectively use all the achievements of science in the biotechnology industry, meet the needs of high-tech organizations performing developments for domestic and foreign pharmaceutical companies and biotech manufacturers.

The choice of disciplines of the variable part, their necessity and sufficiency for the formation of professional competencies of the graduate, taking into account the needs of employers and the requirements of the modern labor market, are aimed at solving the problems specified in the Federal Target Program "Development of the pharmaceutical and medical industry of the Russian Federation for the period up to 2020 and beyond".

The following organizations that conduct advanced research in the field of molecular and cellular biology successfully function on the territory of Primorsky Krai:

- Federal State Budgetary Institution of Science "National Scientific Center for Marine Biology" of the Far Eastern Branch of the Russian Academy of Sciences (NTSMB FEB RAS);

- Federal State Budgetary Institution of Science "Federal Scientific Center for the Biodiversity of Terrestrial Biota of East Asia" of the Far Eastern Branch of the Russian Academy of Sciences (Federal Science Center for Biological Exploration of the Far East Branch of the Russian Academy of Sciences);

- Federal State Budgetary Institution of Science "Pacific Institute of Bioorganic Chemistry" of the Far Eastern Branch of the Russian Academy of Sciences;

- Federal State Budgetary Institution "Pacific Research and Fisheries Center" (FSINI "TINRO-Center").

These enterprises are the customers of specialists and the ideological inspirers of the projects being implemented, and the heads of the enterprises are the chairmen and members of state and certification commissions.

### **11. Characteristics of active / interactive methods and forms of organization of classes, electronic educational technologies used in the implementation of BPEP.**

In the educational process in the direction of training 06.04.01 Biology, the master's program "Molecular and Cellular Biology" provides for the wide application of active and interactive methods and forms of conducting classes. According to the PEP curriculum, using active and interactive methods and forms, 30% of the classroom lessons are conducted (Table 1).

Table 1 - Characteristics of active / interactive methods and forms of organization of classes on the BPEP

Methods and forms of organization of classes on the BPEP	Characteristics of active / interactive methods and forms of organization of classes	Forming competences  GC – General Competence GPC – General Professional Competence PC - Professional Competence
1. Informing lecture	The purpose of the informing lecture is - to give students modern, holistic, interconnected pieces of knowledge, the level of which is determined by the target to each specific topic; - to ensure the creative work of students together with the teacher during the lecture; -to raise professional and business qualities, love for the subject, and to develop independent creative way of thinking, to arouse the necessary interest in students, to	GC - 1 GC -3 GPC -4 GPC -7

- give the direction for an independent work;
- be at the present level of development of science and technology, to be able to forecast their development for the coming years;
- to reflect the methodical processing of the material (highlighting the main thoughts and provisions, emphasizing the conclusions, repeating them in different formulations);
- to be visual, to combine with the demonstration of audiovisual materials and models;
- to be set out in clear and concise language, to contain an explanation of all newly introduced terms and concepts; to be accessible to the audience.

The informing lecture should be:

visual – be easily perceived by the organs of sight.

audial - be easily perceived by the organs of hearing.

textual – be transmitted in the form of symbols intended to denote lexemes of the language.

graphic - be in the form of images, objects, graphs.

sound - be oral or in the form of recording and transmitting lexemes of the language in an auditory way.

special – to contain a specific set of concepts; when used, there is a transfer of information that may not be understood by the majority of society, but necessary and understandable within a narrow social group where this information is used.

actual - information that is valuable at a given time.

reliable - information obtained without distortion.

	<p>understandable - information expressed in a language understandable to whom it is intended.</p> <p>complete - information sufficient to make the right decision or understanding.</p> <p>useful - the usefulness of information is determined by the subject who received the information depending on the scope of its use.</p>	
<p><b>2. Problem lecture</b></p>	<p>In the contrast to the informing lecture, in which students receive interpreted information by the teacher, in problem lecture, the new theoretical material is presented as unknown, which needs to be discovered. The teacher's task is to predict the problem teaching strategy, to ensure the participation of students in the analysis of the arising contradictions, to involve them in solving problems, to teach them to propose original solutions to them, to learn to analyze the resulting new information in the light of well-known theories, put forward hypotheses and use various methods to solve them.</p> <p>To create a problem situation, you may use the following techniques:</p> <ul style="list-style-type: none"> <li>- direct statement of the problem;</li> <li>- problem task in a form of a question;</li> <li>- give students the information containing a contradiction;</li> <li>- the report of the opposite opinions on any issue;</li> <li>- paying attention to one or another life phenomenon that needs to be explained;</li> <li>- the report of facts, cause bewilderment;</li> <li>- comparison of life philosophy with scientific ones;</li> <li>- posing the question to which the student must answer, having listened to a part of the</li> </ul>	<p>GC - 1 GC – 2 GPC - 2 GPC -4</p>

	lecture, and draw conclusions	
3. Seminar-discussion	<p>The discussion of a controversial issue, problems during the seminar. An important characteristic of the discussion that distinguishes it from other types of dispute is argumentation. Discussing a controversial (debatable) problem, each side, opposing the opinion of the interlocutor, argues its position. The teacher during the seminar not only uses the answers of undergraduates to their questions, but also organizes a free exchange of views in the intervals between logical sections. This revives the learning process, activates the cognitive activity of the audience and allows the teacher to manage the collective opinion of the group (stream), using it to persuade, overcome negative attitudes and erroneous opinions arising from undergraduates. The effect is achieved only with the appropriate selection of issues for discussion and skillful, purposeful management of it. The choice of issues for discussion is carried out by the teacher, depending on the degree of preparedness of undergraduates, as well as the specific didactic tasks that the teacher sets for himself in this audience.</p>	<p>GC - 1 GC - 2 GPC - 1 GPC - 2 GPC - 4</p>
4. Seminar-situational analysis	<p>The method lies in the fact that at the seminar class a teacher creates specific situations taken from professional practice. In this case, undergraduates require a deep analysis of the proposed situation and practical solution of the task. This method allows for the seminar class to implement many functions: research, study, evaluation, training, education, development, self-assessment and self-control.</p> <p>When solving a specific situation, students</p>	<p>GC - 1 GC - 2 GPC - 1 GPC - 2 GPC - 4</p>

act like in real practice: they analyze it, use their experience, and also use the methods, tools and analysis criteria that they acquired in the learning process.

There are three main types of situations that a specialist usually faces in professional activity.

The standard situation to a certain extent is typical, often repeated under the same circumstances, has the same causes, and can be both positive and negative.

A critical situation atypical for this professional activity, as a rule, is unexpected, takes by surprise, destroys the initial calculations, plans, can cause moral and economic damage; requires immediate intervention.

Extreme situation (or emergency) is unique, has no analogues in the past, requires the involvement of unplanned material and human resources.

In the practice of applying the method of analyzing a specific situation at a seminar, the following types of specific situations are usually used.

The demonstrative situation is a demonstration of a concrete example from practice in which the laws and mechanisms of actions of officials, typical algorithms for solving technical problems, the effectiveness of using methods and leadership techniques are manifested.

The exercise situation is addressed to specific sources of information, literature, reference



	<p>books or research results. The training effect is provided by the activities of all the participants of the seminar on the situation. To resolve such situations, students need to study reference data, make the necessary calculations.</p> <p>The problem situation implies a problematic task that really has faced or is facing in professional practice. It can be presented to students in the form of a film, television, video of a real event, a magnetic recording of a conversation, an interview, a report, a speech, a set of documents (photographs, graphics, diagrams) reflecting the state of a fact, event, process, simply as folders with a set of documents or in the form of a speech before students of invited specialists.</p> <p>The situation-assessment shows specific events and measures taken on them.</p>	
5. Interdisciplinary workshop	<p>The workshop is about discussing a topic in various aspects: political, economic, scientific, technical, legal, moral and psychological.</p> <p>The relevant experts and specialists are invited in this interdisciplinary workshop. The discussion topics are divide among undergraduates. The method of an interdisciplinary workshop allows to expand the horizons of students, teaches a comprehensive assessment of problems, to recognize interdisciplinary communication.</p>	<p>GC - 1 GC - 2 GPC - 1 GPC - 2 GPC - 4</p>
6. Colloquium - discussion	<p>The current control in the form of discussion upon the list of issues prepared for the colloquium. Discussion of a controversial issue, problems during a colloquium.</p> <p>The teacher during the colloquium not only</p>	<p>GC - 1 GC - 2 GPC - 1 GPC - 2 GPC - 4</p>

	<p>uses the answers of undergraduates to their questions, but also organizes a free exchange of views in the intervals between logical sections.</p> <p>The choice of issues for discussion is made by the teacher, regarding the degree level of undergraduates, as well as the specific didactic tasks that the teacher sets for himself in this audience.</p> <p>Correctly expressed answers to questions are evaluated and transferred to the rating system for assessing students' knowledge.</p>	
7. Research	<p>Research work is one of the types of independent practical work of undergraduates, which helps, through conducting experiments, to deepen and consolidate theoretical knowledge.</p> <p>The following objectives are achieved by conducting research:</p> <ul style="list-style-type: none"> <li>- deepening and consolidating the knowledge of the theoretical course through practical study of the laws and regulations in laboratory conditions;</li> <li>- acquisition of skills in scientific experimentation, analysis of the obtained results;</li> <li>- practical acquaintance with the equipment and its manuals;</li> <li>- the formation of the primary skills of organization, planning and design of the research.</li> </ul> <p>Special disciplines, including technical ones, promote a work, which will be done by undergraduates in future.</p> <p>The design of the research work contributes to the establishment of logical links between the main course and other academic disciplines so that the undergraduates understand it as a complete system with the</p>	<p>GC - 1 GC - 3 GPC - 1 GPC - 3 GPC - 4 GPC - 5 GPC - 6 GPC - 9 PC-1 PC- 2 PC- 3 PC- 4</p>

	entire structure reflecting the major studied.	
8. Project Management	<p>The way to achieve the didactic goal is through the detailed technology development, which should be resulted in a real, tangible practical issue.</p> <p>This is a set of techniques, actions of students in their specific order to achieve the task - solving the problem, personally important for students and executed in the form of some kind of final product.</p> <p>The main purpose of the project management is to provide students with the opportunity to independently acquire knowledge in the process of solving practical problems or problems that require the integration of knowledge from various subject areas.</p> <p>Management involves the use of a set of research, search, problem methods. The teacher within the project has the role of coordinator, expert, consultant. The basis of the project management is the development of students' cognitive skills, the ability to independently construct their knowledge, the ability to navigate the information space, the development of critical and creative thinking.</p> <p>The project management is always focused on the independent activities of students - individual, steam, group, which students perform for a certain period of time.</p> <p>This method is organically combined with group methods. The project management involves solving a problem. The solution of the problem involves, on the one hand, the use of a combination of various methods, means of training, and on the other, it implies the need to integrate knowledge, skills to apply knowledge from various fields of</p>	PC-1 PC- 3

	<p>science, technology, technology, creative fields.</p> <p>The results of completed projects should be specific, ready to use. If we talk about the project management as a pedagogical technology, this technology involves a set of research, search, problem methods, creative in their very essence.</p>	
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