



MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION  
Federal state autonomous educational institution  
of higher education  
**«Far Eastern Federal University»**  
(FEFU)

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**INSTITUTE OF LIFE SCIENCES AND BIOMEDICINE (SCHOOL)**

AGREED

Head of OP

APPROVE

Head of VSP

Kalenik T.K.  
(signature) (full name)  
«28» September 2021 г.

Kalenik T.K.  
(signature) (full name)  
«28» September 2021 г.

**WORKING PROGRAM OF THE DISCIPLINE**

«Current trends in biotechnology»  
Direction of training 19.04.01 «Biotechnology»  
(«Agri-Food Biotechnology»)  
Form of training full-time

course 2 semester 3  
lectures 18 hours  
practical classes 36 h.  
laboratory work 0 hours.  
including using  
total classroom hours 36 hours.  
independent work 54 h.  
including preparation for the exam 0 hours (if the exam is provided).  
control works (quantity) are not provided  
term paper / term project are provided  
credit 3 semester  
exam not included

Рабочая программа составлена в соответствии с требованиями образовательного стандарта, самостоятельно устанавливаемого ДВФУ, утвержденного приказом ректора от 07.07.2015 № 12-13-1282

Рабочая программа обсуждена на заседании Департамента пищевых наук и технологий Института наук о жизни и биомедицины (Школа) ДВФУ протокол № 1 от «28» сентября 2021г.

Директор Департамента Каленик Т.К.  
Составитель (ли): д.б.н., проф. Т.К. Каленик

**Reverse side of the title page of the RPMU**

**I. The work program was revised at the meeting of the department:**

Protocol dated « \_\_\_\_\_ » \_\_\_\_\_ 20\_\_ № \_\_\_\_\_

Director \_\_\_\_\_  
(signature) (full name)

**II. The work program was revised at the meeting of the department:**

Protocol dated « \_\_\_\_\_ » \_\_\_\_\_ 20\_\_ № \_\_\_\_\_

Director \_\_\_\_\_  
(signature) (full name)

**III. The work program was revised at the meeting of the department:**

Protocol dated « \_\_\_\_\_ » \_\_\_\_\_ 20\_\_ № \_\_\_\_\_

Director \_\_\_\_\_  
(signature) (full name)

**IV. The work program was revised at the meeting of the department:**

Protocol dated « \_\_\_\_\_ » \_\_\_\_\_ 20\_\_ № \_\_\_\_\_

Director \_\_\_\_\_  
(signature) (full name)

ANNOTATION  
of the educational complex of discipline  
«Current trends in biotechnology»  
Direction of preparation: 04.19.01 Biotechnology  
Educational program: "Agri-Food Biotechnology"

The educational-methodical complex of the discipline «Current trends in biotechnology» was developed for 2nd year students in the direction 19.04.01 «Biotechnology» master's program «Agri-Food Biotechnology» in accordance with the requirements of the educational standard, independently established by FEFU, approved by order of the rector of 07.07.2015 No. 12-13-1282 in this direction.

The discipline «Current trends in biotechnology» is included in the basic part of the curriculum.

The total complexity of mastering the discipline is 108 hours. The curriculum includes lecture classes (18 hours), practical classes (36 hours), independent work of the student (54 hours). Discipline is implemented in the 2nd year in the 3rd semester.

The content of the discipline covers the following range of issues:

- industry development trends and their technological design;
- biotechnological features of the production of raw materials of plant and animal origin;
- intensive and (or) resource-saving technologies for the production of innovative food products.

The discipline «Current trends in biotechnology» is logically and meaningfully connected with such courses as «Administration and Management of Agriculture and the Agro-Industrial Complex», «Research Methods in Biotechnology», «Agricultural Biotechnology and Biotechnology of Raw Materials of Animal and Plant Origin».

The discipline is aimed at the formation of professional competencies.

Educational complex includes:

- the work program of the discipline;
- educational and methodological support of students' independent work (Appendix 1);
- appraisal fund (appendix 2).

Директор Департамента

пищевых наук и технологий



Каленик Т.К.

## ABSTRACT

**Bachelor's/Specialist's/Master's degree in 19.04.01 Biotechnology**

**Study profile/ Specialization/ Master's Program "Title" "Agri-food biotechnology"**

**Course title:** Current trends in biotechnology

**Basic part of Block 1, 3 credits**

**At the beginning of the course a student should be able to:**

- 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 professional activity;
- the ability and willingness to use the basic laws of natural sciences in professional activities;
- the ability to use knowledge of modern physical picture of the world, the laws of space-time, the structure of matter to understand the world and natural phenomena;
- the ability to work with scientific and technical information, to use the Russian and international experience in professional work;
- possession of the main methods and techniques of experimental research in the professional field; ability to carry out standard and certification tests of raw materials, finished products and production processes;
- knowledge of methods of experimental design, processing and presentation of the results.

**Learning outcomes:**

GC -1the ability to creatively adapt the achievements of foreign science, technology and education to the domestic practice, a high degree of professional mobility; GC -4 the ability to quickly learn new subject areas, identify contradictions, problems and develop alternatives to solve them; GC -10 the ability

to improve and develop their intellectual and cultural level, to gain knowledge in the field of contemporary issues in science, engineering and technology, the humanities, social and economic sciences; SPC -2 the ability to analyze scientific and technical information in the field of biotechnology and related disciplines in order to provide scientific, patent and marketing support for basic research and technological research; SPC - 13 willingness to organize, plan and manage existing biotechnological processes and production; SPC -17 willingness to conduct research and industrial development of the technology and scaling processes.

**Main course literature:** 1. Biotechnology meat and meat products. Lecture Course: Textbook for Universities / IA Rogov, AI Zharinov, LA Tekuteva etc. - M.: DeLiprint, 2009. - 294 p. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:664778&theme=FEFU>

2. Ivanov, LA Food Biotechnology / LA Ivanova, LI War, IS Ivanova. - M.: KolosS, 2008. - 472 p. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:352320&theme=FEFU>

3. Klunova, SM Biotechnology: a textbook for high schools / SM Klunova, TA Egorova EA Zhivuhina - M.: Academy, 2010. - 256 p. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:416005&theme=FEFU>

4. Technology of animal feed and aquatic organisms (biotechnological aspects): the textbook for students enrolled on the specialty 240902 "Food Biotechnology" / TK Kalenik, LN Fedyanina, TV Tanashkina, LA Tekuteva. - Vladivostok: Publishing house TSUE, 2009. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:356708&theme=FEFU>

5. Simulation of food formulations and their technologies. Theory and practice: a manual for schools / OM Krasulia, SV Nikolaev, AV Tokarev and others - St. Petersburg. GIORD, 2015. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:783701&theme=FEFU>

6. Antipov, LV Anatomy and Histology of farm animals: the textbook / LV Antipova, VS Slobodjanik, SM Suleimanov. - Moscow: Colossus, 2005. Access:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:351703&theme=FEFU>

**Form of final knowledge control: credit**

**Annotation to the work program of the discipline**  
«Current trends in biotechnology»

The discipline «Current trends in biotechnology» is included in block B1.B.02.04 and relates to the basic part of the training direction 19.04.01 Biotechnology, master's program «Agri-Food Biotechnology».

The total complexity of mastering the discipline is 3 credits, 108 hours. The discipline is implemented in the 2nd year in the 3rd semester.

When teaching the discipline, the knowledge and skills acquired during the development of such disciplines as «Administration and Management of Agriculture and the Agro-Industrial Complex», «Research Techniques in Biotechnology», «Agricultural Biotechnology and Biotechnology of Raw Materials of Animal and Plant Origin» are used.

**The purpose of the discipline:** to familiarize undergraduates with general questions and theoretical foundations for the development of agri-food biotechnology, the production of innovative food products, the main technological processes of production based on the use of modern achievements of science and technology.

**Objectives of the discipline:**

- the study of industry trends and their technological design;
- the study of the biotechnological characteristics of the production of raw materials of plant and animal origin;
- the study of intensive and (or) resource-saving technologies for the production of innovative food products.

As a result of studying this discipline, the following professional competencies (elements of competencies) are formed in students.

Code and wording of competency	Competency Stages	
GC -1 the ability to creatively adapt the achievements	Knows	how to search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies



of foreign science, technology and education to domestic practice, a high degree of professional mobility	Is able	search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies, as well as apply the acquired knowledge in practice.
	Owns	the ability to search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies, as well as apply the acquired knowledge in practice.
GC -4 ability to quickly learn new subject areas, identify contradictions, problems and develop alternative solutions	Knows	methods of critical analysis and evaluation of modern scientific achievements, methods of generating new ideas in solving research and practical problems, including in interdisciplinary fields, methods of scientific research, methods for calculating raw materials, finished products, auxiliary, packaging materials, containers, fundamentals of production technology
	Is able	analyze alternative solutions to research and practical problems and evaluate potential gains / losses of the implementation of these options, work with regulatory and technical documentation of the industry
	Owns	skills of analysis of the main worldview and methodological problems, including interdisciplinary nature arising in science at the present stage of its development, own technologies for planning professional activities in the field of scientific research
GC -10 the ability to improve and develop their intellectual and cultural level, gain knowledge in the field of modern problems of science, engineering and technology, humanitarian, social and economic sciences	Knows	modern advances in agri-food biotechnology of practical importance in food technology
	Is able	analyze current advances in agri-food biotechnology in food technology
	Owns	the ability to apply interdisciplinary knowledge to develop new food manufacturing technologies
SPC -2 Mastery of the basics of biotechnological and biogenic potential of food raw materials. The ability to study food raw materials as a multicomponent, multifunctional, biologically active system, to use the functional and	Knows	main properties of raw materials, food additives and food systems
	Is able	to study edible raw materials under the guidance of a teacher
	Owns	research methods using theoretical knowledge and practical skills

technological properties of raw materials, food additives and food systems		
SPC -13 readiness for organization, planning and management of existing biotechnological processes and production	Knows	rules and features of the organization, planning and management of existing biotechnological processes and production
	Is able	organize the planning and management of existing biotechnological processes and production
	Owns	principles and practices of organization, planning and management of existing biotechnological processes and production
SPC -17 willingness to conduct pilot development of technology and process scaling	Knows	methods for developing an effective strategy and shaping enterprise policies; including competitive concepts, as well as ways to provide the catering company with material and financial resources
	Is able	highlight and systematize the main ideas in scientific texts
	Owns	critically evaluate any incoming information, regardless of the source

To form the above competencies within the framework of the discipline «Current trends in biotechnology», the following methods of active / interactive training are used: problem lectures, simulation games.

## **I. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE**

### **Section I. Modern problems of agri-food biotechnology (6 hours)**

#### **Topic 1. The relevance of the study of discipline (2 hours.)**

Introduction to the subject "Current trends in biotechnology / Current trends in biotechnology" Objectives of the discipline "Modern trends in biotechnology / Current trends in biotechnology". Definition of agri-food biotechnology. Actual problems of agri-food biotechnology.

#### **Topic 2. The main directions of development of biotechnology in agriculture and food industry (4 hours.)**

The structure of the main technologies used in agriculture and food industry. The main factors determining the development of biotechnology in the near future.

## **Section II. Fundamentals of agri-food biotechnology (12 hours.)**

### **Topic 3. General information about the food resources of the Far East and their biotechnological potential (4 hours)**

Agriculture of the Far East. Crop production of the Far East. General information about the biotechnological potential of plant materials. Biotechnological potential of fruit and berry raw materials of the Far East.

### **Topic 4. Agri-food biotechnology (4 hours.)**

The development of plant biotechnology. Biotechnology in the reproduction and selection of cattle. Food biotechnology of products from raw materials of plant and animal origin. The boundaries of the application of biotechnology in the food industry.

### **Topic 5. Processing of agricultural products and development trends (4 hours.)**

New technologies for crop and livestock production. Prospects for the development of technology for storage and processing of crop products, fruits and vegetables, as well as livestock products.

Prospects for the development of microbiological technologies in obtaining organic fertilizers, feed and processing agricultural products. Technologies for the production and procurement of feed for farm animals.

## **II. STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE**

### **Practical classes (18h.)**

#### **Lesson 1. The structure of agriculture and development trends (6 hours.)**

1. Definition of agribusiness.
2. The main areas of agriculture and their characteristics, development trends.
3. The main functions and tasks of the agro-industrial complex.

## **Lesson 2. General issues and biotechnological potential of food resources of the Far East (4 hours)**

1. General information about the food resources of the Far East
2. Raw materials of plant origin: general information during harvesting, storage.
3. Classification of fruit and berry raw materials of the Far East.
4. Biotechnological potential of raw materials of animal and vegetable origin of the Far Eastern region.

## **Lesson 3. Using the method of active learning. Imitation game (8 hours).**

1. Topic: Functional food products from the Far Eastern raw materials
2. The concept of the game: the study of the human nutrition system of a functional orientation.
3. Roles. The girl (guy) chooses a functional nutrition system, taking into account the characteristics of age and the nature of work.

Among students, experts and a medical professional are selected. The remaining students are divided into three groups. The task of each group is to convince experts that a particular food system is suitable for a girl (guy).

4. Expected results: introducing students to a functional nutrition system taking into account the Far East region, identifying the positive and negative sides of the nutrition system, the ability to select functional foods and calculating their calorie content, depending on age and nature of work.

The participants in the game are a group of students.

## **III. TRAINING AND METHODOLOGICAL SUPPORT OF STUDENTS'S INDEPENDENT WORK**

Educational and methodological support for the independent work of students in the discipline "Current trends in biotechnology" is presented in Appendix 1 and includes:

- a schedule of independent work on the discipline, including approximate norms of time to complete each task;
- characteristics of tasks for independent work of students and guidelines for their implementation;
- requirements for the presentation and presentation of the results of independent work;
- criteria for evaluating the performance of independent work.

#### IV. CONTROL OF ACHIEVING COURSE OBJECTIVES

№	Supervised sections / topics of discipline	Codes and stages of formation of competencies		Evaluation Tools	
				current control	intermediate certification
1	Section I. Modern problems of agri-food biotechnology	GC-1 GC-4 GC-10 SPC-2 SPC-13 SPC-17	knows the structure of the main technologies used in agri-food biotechnology  Able to navigate the basic technologies used in agri-food biotechnology  Owns comprehensive knowledge in the field of technologies used in agri-food biotechnology	UO-2 – colloquium	Exam questions 1-6
2	Section II. Fundamentals of Agri-Food Biotechnology	GC-1 GC-4 GC-10 SPC-2 SPC-13 SPC-17	knows the main areas of biotechnology in agriculture and industry; fundamentals of agri-food biotechnology  Able to navigate the biotechnology	UO-2 - colloquium, PR4 – essay	Exam questions 7-15

			of agriculture and industry		
			owns the main areas of biotechnology in agriculture and industry; fundamentals of agri-food biotechnology		

Typical control tasks, methodological materials that determine the procedures for assessing knowledge, skills and (or) experience, as well as criteria and indicators necessary for assessing knowledge, skills, and characterizing the stages of formation of competencies in the process of mastering an educational program are presented in the Appendix 2.

## **V. LIST OF TRAINING LITERATURE AND INFORMATION AND METHODOLOGICAL SUPPORT OF DISCIPLINE**

### **Main literature**

*(print and electronic publications)*

1. Biotechnology of meat and meat products. Lecture course: textbook for universities / I.A. Rogov, A.I. Zharinov, L.A. Tekutieva et al. - M.: DeLiprint, 2009. -- 294 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:664778&theme=FEFU>
2. Ivanova, L.A. Food Biotechnology / L.A. Ivanova, L.I. War, I.S. Ivanova. - M.: KolosS, 2008. -- 472 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:352320&theme=FEFU>
3. Klunova, S. M. Biotechnology: a textbook for high schools / S. M. Klunova, T. A. Egorova, E. A. Zhivukhina - M.: Academy, 2010. - 256 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:416005&theme=FEFU>
4. The technology of processing raw materials of animal origin and aquatic organisms (biotechnological aspects): a textbook for university students

enrolled in specialty 240902 "Food biotechnology" / T.K. Kalenik, L.N. Fedyanina, T.V. Tanashkina, L.A. Tekutieva. - Vladivostok: Publishing house of TSEU, 2009. Access mode:

<http://lib.dvfu.ru:8080/lib/item?id=chamo{56568&theme=FEFU}>

5. Modeling food recipes and technologies for their production. Theory and practice: a textbook for universities / O. N. Krasulya, S.V. Nikolaev, A.V. Tokarev et al. - St. Petersburg: GIORD, 2015. Access mode:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:783701&theme=FEFU>

6. Antipova, L.V. Anatomy and histology of farm animals: a textbook / L. V. Antipova, V. S. Slobodyanik, S. M. Suleymanov. - Moscow: KolosS, 2005. Access mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo{51703&theme=FEFU}>

7. Burova, T.E. Introduction to professional activities. Food Biotechnology [Electronic resource]: study guide / T.E. Burov. - The electron. Dan. - St. Petersburg: Lan, 2019. -- 160 p. <https://e.lanbook.com/book/108329>

8. The journal «University News. Applied Chemistry and Biotechnology (publishing house of the Federal State Budgetary Educational Institution of Higher Education» Irkutsk National Research Technical University»; Web of Science, RSCI) [http://journals.istu.edu/izvestia\\_biochemi/archive](http://journals.istu.edu/izvestia_biochemi/archive)

### **Additional literature**

*(print and electronic publications)*

1. Physico-chemical and biochemical principles of the production of meat and meat products: textbook. manual for universities / N.S. Danilova - M. : KolosS, 2008. Access mode:

<http://lib.dvfu.ru:8080/lib/item?id=chamo:351447&theme=FEFU>

2. Vitol, I.S. The safety of food raw materials and food: a textbook for universities / I.S. Vitol, A.V. Kovalenok, A.P. Nechaev. - M. : DeLiprint, 2010. -- 350 p. Access Mode:

<http://lib.dvfu.ru:8080/lib/item?id=chamo{59009&theme=FEFU}>

3. Danilova, N.S. Physicochemical and biochemical foundations of the production of meat and meat products: a textbook for universities / N.S. Danilova; [ed. L. Yu. Kryukova]. - M.: KolosS, 2008 .-- 277 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:351447&theme=FEFU>
4. Palagina, M.V. Food and biologically active additives: a training manual / M.V. Palagina, T.P. Yudina, V.P. Korchagin. - Vladivostok: Publishing House of TSEU, 2007. - 102 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:50502&theme=FEFU>
5. Rimareva, L.I. Theoretical and practical foundations of yeast biotechnology: a textbook for universities / L.V. Rimareva. - M.: DeLiprint, 2010 .-- 251 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:358974&theme=FEFU>
6. Rogov, I.A. Food biotechnology: a textbook for high schools / I.A. Rogov, L.V. Antipova, G.P. Shuvaev. - M.: KolosS, 2004 .-- 440 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:42243&theme=FEFU>
7. Rogov, I.A. Chemistry of food: a textbook for high schools / I.A. Rogov, L.V. Antipova, N.I. Dunchenko. - M.: KolosS, 2007 .-- 653 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:351155&theme=FEFU>
8. Technology of meat and meat products: a textbook for universities. 1 / I. A. Rogov, A. G. Zabashta, G. P. Kazyulin; [ed. E. V. Yarnykh]. - M.: KolosS. – 2009. 565 s. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:57139&theme=FEFU>
9. Technology of fish and fish products: a textbook for high schools / S.A. Artyukhova, V.V. Baranov, N.E. Mash [and others]; under the editorship of A.M. Ershov. - M.: KolosS, 2010 .-- 1063 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:665020&theme=FEFU>
10. Tikhomirova, N.A. Technology of milk and dairy products. Oil technology (technological notebooks): a textbook for universities / N.A. Tikhomirova. - SPb.: GIORD, 2011. 141 s. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:664674&theme=FEFU>



11. Tsoglin, L.N. Biotechnology of microalgae / L. N. Tsoglin, N. A. Pronina. - M.: Scientific World, 2012 .-- 182 p. Access Mode: <http://lib.dvfu.ru:8080/lib/item?id=chamo:706085&theme=FEFU>

### **Regulatory Materials**

1. <http://docs.cntd.ru/> Electronic fund of legal and regulatory technical documentation.

### **The list of resources of the information and telecommunication network**

#### **"Internet"**

1. <http://elibrary.ru> Scientific Electronic Library eLIBRARY.RU
2. The electronic library system «Doe» <http://e.lanbook.com/>
3. The electronic library system «IPRBOOK» <http://www.iprbookshop.ru>
4. Scopus database: <http://www.scopus.com/home.url>
5. Web of Science Database <http://apps.webofknowledge.com/>
6. Database of full-texting academic journals in China <http://oversea.cnki.net/>
7. The electronic library of dissertations of the Russian State Library <http://diss.rsl.ru/>
8. EBSCO Electronic Databases <http://search.ebscohost.com/>

### **List of information technology and software**

In the process of training in the discipline "Current trends in biotechnology", the following software is used installed on the personal computers of the School of Biomedicine: office suite Microsoft Office 2010 professional plus, version 14.0.6029.1000; educational software package 7-Zip, version 9.20.00.0; training complex of programs Abbyy FineReader 11, version 11.0.460; training package of programs Adobe Acrobat XI Pro, version 11.0.00; browser for working in the environment of WWW Coogle Chrome, version 42.0.2311.90; Teaching software package CoreDraw Graphics Suite X3, version 13.0.0.739.

## **VI. METHODOLOGICAL INSTRUCTIONS FOR THE DEVELOPMENT OF THE DISCIPLINE**

### **Guidelines for organizing an independent study of the discipline.**

#### **Abstracting of educational and scientific literature.**

The review of educational and scientific literature involves an in-depth study of individual scientific works, which should ensure the development of the necessary skills for working on a book. All this will contribute to expanding the scientific horizons, increasing their theoretical training, the formation of scientific competence.

For abstracting, textbooks, individual monographic studies and articles on issues provided for in the curriculum are offered. When selecting literature on the selected issue, it is necessary to cover the most important areas of development of this science at the present stage. Particular attention should be paid to those literary sources that (directly or indirectly) can assist a specialist in his practical activities. However, this section also includes works and individual studies on issues that go beyond the studied discipline. This literature is recommended to be used if you want to expand your knowledge in any branch of science.

Along with the literature on general issues for undergraduates, literature is supposed to be taken into account independently of the profile of their professional activity. Not all of the proposed literature is equivalent in content and volume, so a different approach to its study is possible. In one case, this may be a general review of several literary sources of various authors devoted to the consideration of the same issue, in the other case, a detailed study and review of one of the recommended works or even its individual sections, depending on the degree of complexity of the issue (issue). In order to decide what to do in each case, you should consult with the teacher.

The choice of a specific work for abstracting should be preceded by a detailed familiarization with the list of all literature given in the curriculum of the discipline. It is recommended that you first familiarize yourself with the selected work by looking at the subheadings, selected texts, diagrams, tables, general

conclusions. Then it is necessary to carefully and thoughtfully (delving into the ideas and methods of the author) read it, making notes along the way on a separate sheet of paper about the main points and key issues. After reading, you should consider the content of the article or a separate chapter, paragraph (if it is a monograph) and write it down briefly. Literally, only strict definitions, formulations of laws should be written out. It is sometimes useful to include one or two examples in a record to illustrate. In the event that there are strange places, it is recommended to read the subsequent statement, as it can help to understand the previous material, and then return again to understanding the previous statement.

The result of work on literary sources is an abstract.

In preparing the essay, it is necessary to highlight the most important theoretical points and justify them independently, paying attention not only to the result, but also to the methodology used in studying the problem. Reading non-fiction should be critical. Therefore, we must strive not only to master the main content, but also the method of proof, to reveal the features of various points of view on the same issue, to evaluate the practical and theoretical significance of the results of the abstracted work. A very desirable element of the essay is the expression by the listener of his own attitude to the ideas and conclusions of the author, supported by certain arguments (personal experience, statements of other researchers, etc.).

Abstracts of monographs, journal articles of a research nature must certainly contain a definition of the problem and the specific objectives of the study, a description of the methods used by the author, as well as the conclusions reached by him as a result of the study.

## VII. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Training lab  
Vladivostok, Russian Island, 10  
Ajax, Building 25.1, aud. M329

Training furniture for 25 workplaces, teacher's place (table, chair),  
Multimedia equipment: Monoblock Lenovo C360G-i34164G500UDK; Screen with electric 236 \* 147 cm Trim Screen Line; DLP projector, 3000 ANSI Lm, WXGA 1280x800, 2000: 1 EW330U Mitsubishi; Subsystem of specialized hardware mounts CORSA-2007 Tuarex; Video Switching Subsystem: DVI DXP 44 DVI Pro Extron matrix switcher; Extender DVI over twisted pair DVI 201 Tx / Rx; Subsystem of audio switching and sound reinforcement; ceiling mount speaker SI 3CT LP Extron; Sennheiser EW 122 G3 UHF Microphone Lavalier Radio System with a wireless microphone and receiver; DMP 44 LC Extron digital audio processor; Extron IPL T S4 Network Management Controller; Wireless LANs for students are provided with a system based on 802.11a / b / g / n 2x2 MIMO (2SS) access points.

Training lab  
Vladivostok, Russian Island, 10  
Ajax, Building 25.1, aud. M120

Laboratory of Ecobiotechnology M120:  
Training furniture for 10 workplaces, Teacher's place (table, chair),  
Total Organic Carbon Analyzer, Model TOC-L Manufacturer 'Shimadzu'; Gas chromatography mass spectrometer GCMS-QP2010 Ultra; LC-20 Prominece High Performance Liquid Chromatography Module; Monoblock Lenovo C360G-i34164G500UDK; HP Pro 6200 SFF i3 2120 / 2Gb / 500Gb PC, Viewsonic 20 Monitor.

Training lab  
Vladivostok, Russian Island, 10  
Ajax, Building 25.1, aud. M122

Laboratory of Ecobiotechnology M120:  
Training furniture for 10 workplaces, Teacher's place (table, chair),  
Total Organic Carbon Analyzer, Model TOC-L Manufacturer 'Shimadzu'; Gas chromatography mass spectrometer GCMS-QP2010 Ultra; LC-20 Prominece High Performance Liquid Chromatography Module; Monoblock Lenovo C360G-i34164G500UDK; HP Pro 6200 SFF i3 2120 / 2Gb / 500Gb PC, Viewsonic 20 Monitor.

Reading rooms of the FEFU  
Scientific Library with open access  
to the fund

All-in-One HP All-in-One 400 All-in-One  
Monoblock 19.5 (1600x900), Core i3-4150T,  
4GB DDR3-1600 (1x4GB), 1TB HDD 7200

Vladivostok, Russian island, 10  
Ajax, building A - level 10

SATA, DVD +/- RW, GigEth, Wi-Fi, BT, usb  
kbd / mse, Win7Pro (64-bit) + Win8.1Pro (64-  
bit), 1-1-1 Wty Internet access speed of 500  
Mbps. Workplaces for people with disabilities  
are equipped with braille displays and printers;  
equipped with: portable devices for reading  
flat-printed texts, scanning and reading  
machines with a video enlarger with the ability  
to control color spectra; magnifying electronic  
magnifiers and ultrasonic markers

Computer class  
Vladivostok, Russian Island, 10  
Ajax, Building 25.1, aud. M621,  
area 44.5 m<sup>2</sup>

Monoblock Lenovo C360G-i34164G500UDK  
19.5 "Intel Core i3-4160T 4GB DDR3-1600  
SODIMM (1x4GB) 500GB Windows Seven  
Enterprise - 17 pcs; Wired LAN - Cisco 800  
series; Wireless LAN for students with a  
system based on 802.11a / b access points / g /  
n 2x2 MIMO (2SS)



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ  
Федеральное государственное автономное образовательное учреждение  
высшего образования  
«Дальневосточный федеральный университет»  
(ДФУ)

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**ИНСТИТУТ НАУК О ЖИЗНИ И БИОМЕДИЦИНЫ (ШКОЛА)**

**УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ САМОСТОЯТЕЛЬНОЙ  
РАБОТЫ ОБУЧАЮЩИХСЯ**  
по дисциплине «Current trends in biotechnology»  
Направление подготовки 19.04.01 Биотехнология  
магистерская программа «Agri-Food Biotechnology»  
Форма подготовки очная

**Владивосток  
2021**

### Schedule of independent work on the discipline

<b>№</b>	<b>Date / Deadline</b>	<b>Type of independent work</b>	<b>Estimated time to complete</b>	<b>Form of control</b>
2	1-6 week	Preparing for the colloquium	18	UO-2
3	6-7 week	Preparation for the colloquium, Preparation of essays	18	UO-2 PR-4
4	8-19 week	Preparing for the colloquium	18	UO-2

Students' independent work consists of preparing for practical classes, working on recommended literature, writing reports on the topic of a seminar, and preparing presentations.

The teacher offers each student individual and differentiated tasks. Some of them can be carried out in a group (for example, several students can do the preparation of a report and presentation on the same topic, sharing their responsibilities - one prepares the scientific and theoretical part, and the second analyzes the practice).

#### **Tasks for self-fulfillment**

1. On a given topic should be an analysis of the literature on the studied discipline. According to the developed material, a colloquium should be prepared and presented.

2. Writing an essay on a topic proposed by the teacher or independently selected by the student and agreed with the teacher.

## **Methodological instructions for the implementation of the essay**

### **The goals and objectives of the essay**

The essay (from lat. Referto - report, report) is a summary of the problems of a practical or theoretical nature with the formulation of certain conclusions on the subject. A student-selected problem is studied and analyzed based on one or more sources. In contrast to the term paper, which is a comprehensive study of the problem, the essay is aimed at analyzing one or more scientific papers.

*The objectives* of writing an essay are:

development of students' skills in finding relevant problems of modern legislation;

- development of skills to summarize the material with highlighting only the most significant points necessary to reveal the essence of the problem;

- development of skills to analyze the material studied and formulate their own conclusions on the selected issue in writing, in a scientific, competent language.

*The tasks* of writing an essay are:

- teach the student to convey the opinions of the authors as faithfully as possible, on the basis of which the student writes his essay;

- teach the student to correctly state their position on the problem analyzed in the abstract;

- prepare the student for further participation in scientific - practical conferences, seminars and competitions;

- help the student to determine the topic of interest to him, the further disclosure of which is possible when writing a term paper or diploma;

- to clarify for themselves and state the reasons for their consent (disagreement) with the opinion of one or another author on this issue.

### **The basic requirements for the content of the essay, course project**

The student should use only those materials (scientific articles, monographs, manuals) that are directly related to their chosen topic. Remote reasoning not



related to the problem being analyzed is not allowed. The content of the essay should be specific, only one problem should be investigated (several are allowed, only if they are interconnected). The student must strictly adhere to the logic of presentation (start with the definition and analysis of concepts, go to the problem statement, analyze the ways to solve it and draw the appropriate conclusions). The essay should end with a conclusion on the topic.

*The structure* of the essay consists of:

1. The title page;
2. Introduction, where the student formulates the problem to be analyzed and investigated;
3. The main text, which consistently reveals the selected topic. Unlike term paper, the main text of the essay involves a division into 2-3 paragraphs without highlighting the chapters. If necessary, the text of the abstract can be supplemented by illustrations, tables, graphs, but they should not "overload" the text;
4. Conclusions, where the student formulates conclusions made on the basis of the main text.
5. The list of used literature. This list refers to those sources that the student refers to in preparing the essay, as well as others that were studied by him during the preparation of the essay.

The essay is 10-15 pages of typewritten text, but in any case should not exceed 15 pages. Interval - 1.5, font size - 14, margins: left - 3 cm, right - 1.5 cm, upper and lower - 1.5 cm. Pages must be numbered. The indent from the beginning of the line is 1.25 cm.

### **The order of delivery of the essay and its assessment**

Essays are written by students during the semester in the terms set by the teacher in a particular discipline, reported by the student and submitted for discussion. The printed version is given to the teacher, leading the discipline.

Based on the results of the check, the student is given a certain number of points, which is included in the total number of student points scored by him

during the semester. When evaluating the essay, the correspondence of the content to the chosen topic, the clarity of the work structure, the ability to work with scientific literature, the ability to pose a problem and analyze it, the ability to think logically, knowledge of professional terminology, and literacy are taken into account.

### **Recommended topics and list of abstracts**

1. The main groups of the food industry, depending on the degree of merger of raw materials and consumer factors);
2. Structural features of the development of food biotechnology;
3. Food of a new generation (based on dairy raw materials).
4. Food of a new generation (based on meat raw materials).
5. Food of a new generation (based on fish raw materials).
6. Food of a new generation (based on plant materials).
7. Food of a new generation (based on non-fish raw materials).
8. The biotechnological potential of using wastes from the processing of basic raw materials in the creation of new food products (raw milk).
9. The biotechnological potential of using wastes from the processing of basic raw materials when creating new food products (fish raw materials).
10. The biotechnological potential of the use of waste from the processing of basic raw materials when creating new food products (meat raw materials).



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ  
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**ИНСТИТУТ НАУК О ЖИЗНИ И БИМЕДИЦИНЫ (ШКОЛА)**

**ФОНД ОЦЕНОЧНЫХ СРЕДСТВ**  
по дисциплине «Current trends in biotechnology»  
Направление подготовки 19.04.01 Биотехнология  
магистерская программа «Agri-Food Biotechnology»  
**Форма подготовки очная**

**Владивосток**  
**2021**

## FOS PASSPORT

Code and wording of competency	Competency Stages	
<b>GC -1</b> the ability to creatively adapt the achievements of foreign science, technology and education to domestic practice, a high degree of professional mobility	Knows	how to search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies
	Is able	search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies, as well as apply the acquired knowledge in practice.
	Owns	the ability to search, store, process and analyze information from various sources and databases, present it in the required format using information, computer and network technologies, as well as apply the acquired knowledge in practice.
<b>GC -4</b> ability to quickly learn new subject areas, identify contradictions, problems and develop alternative solutions	Knows	methods of critical analysis and evaluation of modern scientific achievements, methods of generating new ideas in solving research and practical problems, including in interdisciplinary fields, methods of scientific research, methods for calculating raw materials, finished products, auxiliary, packaging materials, containers, fundamentals of production technology
	Is able	analyze alternative solutions to research and practical problems and evaluate potential gains / losses of the implementation of these options, work with regulatory and technical documentation of the industry
	Owns	skills of analysis of the main worldview and methodological problems, including interdisciplinary nature arising in science at the present stage of its development, own technologies for planning professional activities in the field of scientific research
<b>GC -10</b> the ability to improve and develop their intellectual and cultural level, gain knowledge in the field of modern problems of science, engineering and technology, humanitarian, social and economic sciences	Knows	modern advances in agri-food biotechnology of practical importance in food technology
	Is able	analyze current advances in agri-food biotechnology in food technology
	Owns	the ability to apply interdisciplinary knowledge to develop new food manufacturing technologies

<b>SPC -2</b> Mastery of the basics of biotechnological and biogenic potential of food raw materials. The ability to study food raw materials as a multicomponent, multifunctional, biologically active system, to use the functional and technological properties of raw materials, food additives and food systems	Knows	main properties of raw materials, food additives and food systems
	Is able	to study edible raw materials under the guidance of a teacher
	Owns	research methods using theoretical knowledge and practical skills
<b>SPC -13</b> readiness for organization, planning and management of existing biotechnological processes and production	Knows	rules and features of the organization, planning and management of existing biotechnological processes and production
	Is able	organize the planning and management of existing biotechnological processes and production
	Owns	principles and practices of organization, planning and management of existing biotechnological processes and production
<b>SPC -17</b> willingness to conduct pilot development of technology and process scaling	Knows	methods for developing an effective strategy and shaping enterprise policies; including competitive concepts, as well as ways to provide the catering company with material and financial resources
	Is able	highlight and systematize the main ideas in scientific texts
	Owns	critically evaluate any incoming information, regardless of the source

№	Supervised sections / topics of discipline	Codes and stages of formation of competencies		Evaluation Tools	
				current control	intermediate certification
1	Section I. Modern problems of agri-food biotechnology	GC-1 GC-4 GC-10 SPC-2 SPC-13 SPC-17	knows the structure of the main technologies used in agri-food biotechnology Able to navigate the basic technologies used in agri-food biotechnology Owns comprehensive knowledge in the field	UO-2 – colloquium	Exam questions 1-6

			of technologies used in agri-food biotechnology		
2	Section II. Fundamentals of Agri-Food Biotechnology	GC-1 GC-4 GC-10 SPC-2 SPC-13 SPC-17	knows the main areas of biotechnology in agriculture and industry; fundamentals of agri-food biotechnology	UO-2 - colloquium, PR4 – essay	Exam questions 7-15
			Able to navigate the biotechnology of agriculture and industry		
			owns the main areas of biotechnology in agriculture and industry; fundamentals of agri-food biotechnology		

**Scale for assessing the level of competency formation in the discipline "Current trends in biotechnology"**

Code and wording of competency	Competency Stages	Criteria	Indicators	Points
GC-1 the ability to creatively adapt the achievements of foreign science, technology and education to domestic practice, a high degree of professional mobility	knows (threshold level)	Fragmented ideas about the achievements of foreign science, technology and education in domestic practice, a high degree of professional mobility	UO-2 – colloquium  The student spends quite independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the sense or content of the	75-61

				<p>problem, the design of the work.</p> <p>The work is a retransmitted or completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.</p>	60-50
	able (advanced)	<p>Formed ideas about the achievements of foreign science, technology and education to domestic practice, a high degree of professional mobility</p>	UO-2 – colloquium	<p>The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding</p>	85-76

				the problem. One or two errors in the design of the work	
	owns (high)	Extended ideas about the achievements of foreign science, technology and education in domestic practice, a high degree of professional mobility	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	100-86
GC-4 ability to quickly learn new subject areas, identify contradictions, problems and develop alternative solutions	knows (threshold level)	Fragmented ideas about new subject areas, the ability to identify contradictions, problems and develop alternative solutions	UO-2 – colloquium	The student spends quite independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic	75-61



				<p>were brought. No more than 2 errors were made in the sense or content of the problem, the design of the work.</p> <p>The work is a retransmitted or completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.</p>	60-50
	able (advanced)	Formed knowledge of new subject areas, the ability to identify contradictions, problems and develop alternative solutions	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given.	85-76

				Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	
	owns (high)	Expanded knowledge about new subject areas, the ability to identify contradictions, problems and develop alternative solutions	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	100-86
GC-10 the ability to improve and develop their intellectual and cultural level, gain knowledge in the field of modern	knows (threshold level)	Fragmented knowledge about the improvement and implementation of their intellectual and cultural level, the ability to obtain	UO-2 – colloquium	The student spends quite independent analysis of the main stages and semantic components of the problem; understands the basic foundations	75-61

problems of science, engineering and technology, humanitarian, social and economic sciences		knowledge in the field of modern problems of science, engineering and technology, humanitarian, social and economic sciences		<p>and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the sense or content of the problem, the design of the work.</p> <p>The work is a retransmitted or completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.</p>	60-50
	able (advanced)	Formed knowledge on the improvement and implementation of one's intellectual and cultural level, the ability to acquire knowledge in the field of	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake was made in explaining the meaning or content of the	85-76

		modern problems of science, engineering and technology, humanitarian, social and economic sciences		problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	
	owns (high)	Extended knowledge about improving and implementing one's intellectual and cultural level, the ability to gain knowledge in the field of modern problems of science, engineering and technology, humanitarian, social and economic sciences	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	100-86
SPC-2 Mastery of the basics of biotechnologi	knows (threshold level)	main properties of raw materials, food additives and food systems	UO-2 – colloquium	The student spends quite independent analysis of the main stages	75-61

<p>cal and biogenic potential of food raw materials. The ability to study food raw materials as a multicomponent, multifunctional, biologically active system, to use the functional and technological properties of raw materials, food additives and food systems</p>				<p>and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the sense or content of the problem, the design of the work.</p> <p>The work is a retransmitted or completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.</p>	60-50
	<p>able (advanced)</p>	<p>to study edible raw materials under the guidance of a teacher</p>	<p>UO-2 – colloquium</p>	<p>The work is characterized by semantic integrity, coherence and consistency of presentation;</p>	85-76

				no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	
	owns (high)	research methods using theoretical knowledge and practical skills	UO-2 – colloquium	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the	100-86

				work	
SPC-13 readiness for organization, planning and management of existing biotechnological processes and production	knows (threshold level)	rules and features of the organization, planning and management of existing biotechnological processes and production	UO-2 - colloquium, PR-4 - essay	<p>The student spends quite independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the sense or content of the problem, the design of the work.</p> <p>The work is a retransmitted or completely rewritten source text without any comments or analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.</p>	75-61
	able	organize the	UO-2 -	The work is	60-50 85-76

	(advanced)	planning and management of existing biotechnological processes and production	colloquium, PR-4 - essay	characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	
	owns (high)	principles and practices of organization, planning and management of existing biotechnological processes and production	UO-2 - colloquium, PR-4 - essay	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors	100-86





				content of the problem being revealed and in the design of the work.	
	able (advanced)	Formed ideas about the readiness for experimental development of technology and scaling processes	UO-2 - colloquium, PR-4 - essay	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	85-76
	owns (high)	Enhanced understanding of readiness for pilot development of technology and scaling processes	UO-2 - colloquium, PR-4 - essay	The work is characterized by semantic integrity, coherence and consistency of presentation; no more than 1 mistake made when explaining the meaning or content of the problem. For argumentation, data from domestic and	100-86

				foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work	
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**Guidelines that determine the procedures for assessing the results of mastering the discipline**

**Evaluation criteria (written / oral report, abstract, message, essay, including those made in the form of presentations):**

- 100-86 points are awarded to the student if the student has expressed his opinion on the formulated problem, argued for it, accurately determining its content and components. The data of domestic and foreign literature, statistical information, regulatory information. The student knows and possesses the skill of independent research work on the topic of research; methods and techniques of analysis of theoretical and / or practical aspects of the study area. There are no factual errors related to understanding the problem; graphically, the work is framed correctly.

- 85-76 - points - the work is characterized by semantic integrity, coherence and sequence of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two mistakes were made in the design of the work.

- 75-61 points - the student conducts a fairly independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the meaning or

content of the problem, the design of the work is 60-50 points - if the work is a retransmitted or completely rewritten source text without any comments, analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.

### **Evaluation tools for intermediate certification**

Interim certification of students in the discipline "Current trends in biotechnology" is carried out in accordance with local regulations of the FEFU and is mandatory.

### **Criteria for grading a student in the standings in the discipline in the discipline "Current trends in biotechnology":**

<b>Points (rating)</b>	<b>Credit /exam score (standard)</b>	<b>Requirements for formed competencies</b>
100-86	«Credited»/«excellent»	The student is rated as “excellent” if he has deeply and firmly grasped the program material, sets out comprehensively, consistently, clearly and logically in harmony with him, knows how to closely relate theory to practice, freely copes with tasks, questions, and other types of application of knowledge, and does not the answer when modifying tasks, uses the material of monographic literature in the answer, correctly substantiates the decision made, has versatile skills and techniques for performing practical tasks.
85-76	«Credited» / «Good»	The student is rated “good” if he knows the material well, correctly and essentially sets out it, avoiding significant inaccuracies in answering the question, correctly applies theoretical principles when solving practical questions and tasks, and possesses the necessary skills and techniques for their implementation.
75-61	«Credited»/ «satisfactory»	The student is rated as “satisfactory” if he has knowledge of only the basic material, but has not learned its details, admits inaccuracies, insufficiently correct wording, violations of the logical consistency in the presentation of program material, has difficulty in performing practical work.

60-50	«not credited»/ "unsatisfactory"	Evaluation of "unsatisfactory" is given to a student who does not know a significant part of the program material, makes significant mistakes, hesitantly, with great difficulty performs practical work. As a rule, the rating “unsatisfactory” is given to students who cannot continue their studies without additional classes in the relevant discipline.
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### **Questions for the credit**

1. The agro-industrial complex (AIC) of Russia, its concept, structure and significance. Current trends in the development of ash food biotechnology.
2. Features of the development of agri-food biotechnology.
3. The concept of state policy in the field of healthy nutrition.
4. General issues and biotechnological potential of food resources of the Far East.
5. Classification of fruit and berry raw materials of the Far East.
6. Biotechnological potential of raw materials of animal and vegetable origin of the Far Eastern region.
7. Actual problems of agri-food biotechnology.
8. The structure of the basic technologies used in agriculture and food industry.
9. The main factors determining the development of biotechnology in the near future.
10. General information about the biotechnological potential of plant materials.
11. Biotechnological potential of fruit and berry raw materials of the Far East.
12. Food biotechnology of products from raw materials of plant and animal origin. The boundaries of the application of biotechnology in the food industry.
13. New technologies for the production of crop production and livestock.

14. Prospects for the development of technology for storage and processing of crop products, fruits and vegetables, as well as livestock products.

15. Prospects for the development of microbiological technologies in obtaining organic fertilizers, feed and processing agricultural products. Technologies for the production and procurement of feed for farm animals.

### **Evaluation tools for ongoing certification**

#### **Evaluation Criteria**

- 100-86 points are awarded to the student if the student expressed his opinion on the formulated problem, argued for it, accurately determining its content and components. The data of domestic and foreign literature, statistical information, and regulatory information are presented. The student knows and possesses the skill of independent research work on the topic of research; methods and techniques of analysis of theoretical and / or practical aspects of the study area. There are no factual errors related to understanding the problem; graphically, the work is framed correctly

- 85-76 - points - the work is characterized by semantic integrity, coherence and sequence of presentation; no more than 1 mistake was made in explaining the meaning or content of the problem. For argumentation, data from domestic and foreign authors are given. Demonstrated research skills. There are no actual errors related to understanding the problem. One or two errors in the design of the work

- 75-61 points - the student conducts a fairly independent analysis of the main stages and semantic components of the problem; understands the basic foundations and theoretical justification of the chosen topic. The main sources on this topic were brought. No more than 2 errors were made in the meaning or content of the problem, the design of the work

- 60-50 points - if the work is a retransmitted or completely rewritten source text without any comments, analysis. The structure and theoretical component of the topic is not disclosed. Three or more than three errors were made in the semantic content of the problem being revealed and in the design of the work.

#### **Questions for colloquiums, interviews in the discipline**

##### **"Current trends in biotechnology"**

1. What does the concept of rational use of raw materials include?
2. List the main sources of losses resulting from the technological processing of farm animals at meat plants.

3. What are the names of the scientists who contributed to the development and development of low- and non-waste methods of processing livestock, secondary products, non-food waste. What is their development dedicated to?

4. Provide a list of secondary raw materials formed during slaughter and primary processing of livestock and poultry. What signs form the basis of their classification?

5. What types of secondary resources are the reserve for additional production of feed products? Justify the feasibility and effectiveness of this direction of processing with information about their chemical composition and feed value.

6. Give a comparative description of chemical, physical, biochemical methods of processing keratin-containing raw materials. Estimate the feed value and give ways of using hydrolysates.

7. What types of secondary resources of meat and fat production can be considered as a raw material source for food additives and protein fortifiers? Reproduce the technological schemes of their production.

8. What biologically active substances can be obtained by processing secondary raw materials of meat and fat production?

9. List the technological operations during: a) processing of the hat for heparin; b) obtaining gastric juice from canyna; c) isolation and purification of hyalouranic acid from cocks.

10. Uncover the potential of blood as a biologically valuable raw material in the production of non-traditional products for therapeutic and prophylactic purposes.

11. Describe the technical level of modern meat production and the main promising technologies for processing secondary resources to produce products: a) food; b) feed; c) special purpose.

12. What is the essence of the methods of wastewater treatment of meat plants: a) reagent; b) baromembrane.

13. Describe the methods of disposal of valuable components of industrial effluents.

14. Give a description of the technological operations for the production of laundry soap from the fatty waste of meat plants.
15. List the main sources of losses resulting from the technological processing of meat raw materials in the production of sausages and semi-finished products.
16. What are the names of scientists who contributed to the development and development of low- and non-waste methods of processing raw materials for the meat industry. What is their development dedicated to?
17. List the secondary raw materials for the production of sausages and semi-finished products; indicate the possible range of additional products based on various technological schemes for their processing.
18. Describe the assortment of meat and bone semi-finished products, requirements for raw materials and quality indicators of products.
19. What is the essence and hardware design of the methods of additional deboning of pulp tissues: a) physico-chemical; b) mechanical?
20. Describe the chemical composition, microbiological, functional and technological properties, directions of use: a) meat mass; b) bone residue.
21. What are the quality requirements and areas of use of bone residue?
22. List the technological operations in the production of liquid, concentrated and dry broths from bone raw materials.
23. What is the essence of complex bone processing?
24. Describe effective methods of non-waste and low-waste bone processing for enterprises of various capacities.
25. What is the physiological role of collagen in food?
26. Reproduce the technological schemes of production:
  - a) protein stabilizer from pork skin, veins and tendons;
  - b) functional collagen semi-finished products.
27. What methods can improve the functional and technological properties of raw materials with a high mass fraction of connective tissue? What are the new types of products based on it.



28. Describe the nature and prospects of the introduction of extrusion technologies in meat processing enterprises.

### **Evaluation Criteria**

- 100-86 points are awarded to the student, if the student knows and is fluent in the material, expressed his opinion on the formulated problem, argued for it. For preparation, the student uses not only lecture material, but also additional domestic and foreign literature.

- 85-76 - points - the work is characterized by semantic integrity, coherence and sequence of presentation. There are no actual errors related to understanding the problem.

- 75-61 points - the student understands the basic foundations and theoretical justification of the topic. The main sources on this topic were brought.

- 60-50 points - if the answer is a retransmitted source text, without any comments, analysis. Three or more than three errors were made in the semantic content of the topic.