



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

INSTITUTE OF LIFE SCIENCES AND BIOMEDICINE (SCHOOL)

AGREED

Head of OP

Kalenik T.K.

(signature) (full name)

«28» September 2021 г.

APPROVE

Head of VSP

Kalenik T.K.

(signature) (full name)

«28» September 2021 г.

WORKING PROGRAM OF THE DISCIPLINE

Biotechnology for the production of specialized food products
Direction of training 19.04.01 «Biotechnology»
(«Agri-Food Biotechnology»)
Form of training full-time

course 2 semester 4
lectures 9 hours.
practical classes 27 h.
laboratory work 0 hours.
including using
total classroom hours 36 hours.
independent work 72h.
including preparation for the exam 00 hours (if the exam is provided).
control works (quantity) are not provided
term paper / term project are not provided
credit 4 semester
exam not included

The program of the state final certification was compiled in accordance with the requirements of the Federal State Educational Standard in the field of study 19.04.01 Biotechnology, approved by order of the Ministry of Science and Higher Education of the Russian Federation dated August 10, 2021 No. 737.

The program at the meeting of the Academic Council of the Institute of Life Sciences and Biomedicine (School) December 21, 2021
Director of the Department of Food Science and Technology Kalenik T.K.
Compiled by: Kalenik T.K., Senotrusova T.A.

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)

ABSTRACT

Master's degree in 19.04.01 «Biotechnology»

Master's Program «Agri-Food Biotechnology»

Course title: «Biotechnology for the production of specialized food products»

Variable part of Block, 3 credits

Instructor: Ph.D. Yuferova A.A.

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

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

– hold the basic 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;

– possession of experimental design, processing and presentation of the results;

– the ability to participate in the development of technological projects in the group of authors;

– the ability to develop and implement normative documents on standardization, certification of food products.

Learning outcomes:

SPC-11 ability to provide technological discipline, sanitary and hygienic mode of operation of the enterprise, the content of technological equipment in proper technical condition;

SPC-14 ability to use standard and develop new methods of engineering calculations of technological parameters and equipment of biotechnological production;

SPC-17 readiness to conduct pilot technology development and process scaling;

SPC-18 ability to develop and scientifically substantiate optimal integrated certification schemes for biotechnological products;

SPC-19 ability to analyze the performance of the process for compliance with the initial scientific developments.

Course description: The content of the discipline covers a range of issues of creating food for special purposes. The main characteristics of functional ingredients used in biotechnology for special purpose products, the issues of enrichment of products with biologically active additives, probiotic microflora, products of its vital activity, the possibility of expanding the range of special food products by creating combined products are considered.

Main course literature:

1. Food ingredients in the creation of modern food / [ed. V. A. Tutellan, A. P. Nechaev]. Moscow: DeLi Plus, 2014. - 519 p. (2 copies).

<http://lib.dvfu.ru:8080/lib/item?id=chamo:732001&theme=FEFU>

2. Technology products for therapeutic and prophylactic purposes on a dairy basis: a textbook for universities / N. A. Tikhomirova. St. Petersburg: Trinity Bridge, 2010. (5 copies). - 447 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:358444&theme=FEFU>

3. Biotechnology of combined food products based on dairy and microbiological raw materials: method. directions to the lab. works for students special. 240902 "Food Biotechnology" of all forms of training / comp. N.V. Situn, E.S. Fishchenko. Dairy Biotechnology, Vladivostok: Publishing House of the Pacific University of Economics, 2009. - 96 p. (8 copies). <http://lib.dvfu.ru:8080/lib/item?id=chamo:357087&theme=FEFU>

4. Biotechnology: a textbook for universities / S.M. Klunova, T.A. Yegorova, E.A. Zhivukhina, Moscow: Academy, 2010. - 256 p. (5 copies.) <Http://lib.dvfu.ru:8080/lib/item?id=chamo:416005&theme=FEFU>

Form of final knowledge control: credit.

1. Purpose and objectives of mastering the discipline:

The purpose of mastering the discipline "Biotechnology for the production of specialized food products" is to deepen and expand the fundamental and professional knowledge of the master necessary for the production, technological, design and research activities in the field of technology of specialized food products.

Objectives of the discipline are:

- expansion and deepening of knowledge about the scientific foundations and processes for the production of specialized products, about the principles of creating new formulations of specialized products; about the main characteristics of the composition and properties of specialized food products, about modern methods of monitoring technological operations, the quality of raw materials, semi-finished products and finished products;

- consolidation of skills on the principles of constructing process flow diagrams, requirements for the quality of raw materials and products, conducting material calculations and choosing rational conditions for carrying out technological operations.

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

Code and wording of competency	Competency Stages	
SPC-11 ability to provide technological discipline, sanitary and hygienic mode of operation of the enterprise, the content of technological equipment in proper technical condition	Knows	technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition
	Is able	ensure technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition
	Owns	skills to ensure technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition
SPC-14 ability to use standard and develop new methods of	Knows	typical and new methods of engineering calculations of technological parameters and equipment of biotechnological productions

engineering calculations of technological parameters and equipment for biotechnological production	Is able	use standard and develop new methods for engineering calculations of technological parameters and equipment for biotechnological production
	Owens	skills in using standard and developing new methods for engineering calculations of technological parameters and equipment for biotechnological production
SPC-17 readiness to conduct pilot technology development and process scaling	Knows	pilot testing of technology and scaling of processes
	Is able	carry out pilot testing of technology and scaling of processes
	Owens	skills in conducting pilot testing of technology and scaling up processes
SPC-18 ability to develop and scientifically substantiate optimal integrated certification schemes for biotechnological products	Knows	схемы оптимальной комплексной аттестации биотехнологических продуктов
	Is able	вырабатывать и научно обосновывать схемы оптимальной комплексной аттестации биотехнологических продуктов
	Owens	навыками выработки и научного обоснования схем оптимальной комплексной аттестации биотехнологических продуктов
SPC-19 ability to analyze the performance of the process for compliance with the initial scientific developments	Knows	schemes for optimal comprehensive certification of biotechnological products
	Is able	develop and scientifically substantiate schemes for optimal integrated certification of biotechnological products
	Owens	skills in developing and scientific substantiation of schemes for optimal integrated certification of biotechnological products

To form the above competencies within the discipline “Biotechnology for the production of specialized food products”, the following methods of active / interactive training are used: lecture-discussion, round table, method of analysis of specific examples.

2. The complexity of the discipline and types of training sessions in the discipline

The total labor intensity of the discipline is 3 credit units (108 academic hours).

The types of training sessions and work of the student in the discipline can be:

Designation	Types of training sessions and work of the student
Lec	Lectures
Lab	Labs
Pe	Practical exercises
Oc	Online course
SR	Independent work of the student during the period of theoretical training
Control	Independent work of the student and contact work of the student with the teacher during the period of intermediate certification

Discipline structure:

The form of education is full-time.

№	Section namedisciplines	Semester	The number of hours by type of training sessions and work of the student						Forms of intermediate certification, current monitoring of progress
			Lec	Lab	Pe	Oc	SR	Control	
1	Topic 1. Types of food	4	3		9		72		Seminar, credit
2	Topic 2. Functional ingredients used in biotechnology specialized food products	4	3		9				Seminar, credit
3	Topic 3. Lecture-discussion (MAO): Specialized nutrition for various population groups	4	3		9				Seminar, credit
Total:			9	-	27		72		

3. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE

Topic 1. Types of food

Therapeutic nutrition. Therapeutic nutrition. Preventative nutrition. Specialized nutrition. Human nutrition and health. The role of nutrition in maintaining health. Functions and biological effects of food.

Topic 2. Functional ingredients used in biotechnology specialized food products

Microflora, which forms probiotic properties in biotechnology of specialized nutrition products. Ingredients, food and dietary supplements used in the technology of combined specialized products.

Topic 3. Lecture-discussion (MAO): Specialized nutrition for various population groups

During the lecture-discussion, the teacher gives individual examples in the form of situations or briefly formulated problems, respectively, students analyze and discuss specific situations and material. The teacher, when presenting the lecture material, uses the students' answers to their questions and organizes a free exchange of views in the intervals between logical sections.

Questions of the lecture: nutrition of people of intellectual work and students; food products for pregnant and lactating women; baby food, food for children and adolescents; food for athletes; nutrition features of the elderly; herodietic nutrition; other groups of special products; development of special products; identification and examination of specialty products.

4. STRUCTURE AND CONTENT OF THE PRACTICAL PART OF THE COURSE

Practical classes (27 hours)

Lesson 1. «Determination of vitamin C in objects of plant and animal origin»

Points for discussion:

1. The content of ascorbic acid in foods and plants.
2. The safety of vitamin C in foods during cooking.
3. A simplified method for the determination of ascorbic acid in fortified milk.
4. Determination of vitamin C in plant objects.
5. Report design.

Lesson 2. The method of analysis of specific examples (MAO) on the topic: «Studying the process of membraneless osmosis»

Points for discussion:

1. The study of the process of membraneless osmosis using pectins.
2. Advantages of the membraneless osmosis process over traditional technologies.
3. Determination of the composition of skim milk; separation of skim milk into two phases; a study of the composition of natural casein concentrate; a study of the case-free phase composition; analysis of the results obtained and calculation of the degree of transition of solids to the beskazeyin phase.

Lesson 3. «The study of physico-chemical quality indicators of fortified dry milk-vegetable mixtures for baby food»

Points for discussion:

1. The development of methods for determining the physicochemical parameters of fortified milk-vegetable mixtures for baby food: mass fraction of moisture, fat and vitamin C, titratable acidity, solubility index.
2. The range of dry milk-vegetable mixtures, the technology for the production of dry milk-vegetable mixtures, the standardized physicochemical parameters of dry milk-vegetable mixtures.
3. Determination of the mass fraction of moisture, mass fraction of fat, mass fraction of vitamin C, titratable acidity, solubility index of dry milk-vegetable mixtures.

Lesson 4. «The effect of heat treatment on the structural components of the parenchymal tissue of vegetables and the content of vitamin C»

Points for discussion:

1. The study of the tissue structure of raw and boiled vegetables, the establishment of the influence of various technological factors on the accumulation of reducing sugars during heat treatment and on the content of ascorbic acid in raw and boiled vegetables.

2. Familiarization with the changes in some structural elements of cells that occur during the heat treatment of products

3. Determination of the amount of reducing sugars obtained by heat treatment and the content of vitamin C in raw and heat-treated vegetables and stored in a hot state; generalization of results and conclusions.

Lesson 5. «Technological basis for the production of canned meat for baby food»

Points for discussion:

1. Mastering the technology for the production of canned meat. The study of the requirements for the quality of canned meat.

2. The basic principles of the production of canned meat for baby food.

3. Analysis of the influence of technological factors on the quality of canned meat; calculation of the nutritional value of canned food; drawing up technological schemes for the production of canned food; experimental determination of the mass fraction of moisture, fat and protein in manufactured canned food, comparison with theoretical data.

Lesson 6. Round table (MAO) on the topic: «Technological basis for the production of canned fish for baby food»

Points for discussion:

1. Mastering the technology for the production of canned fish. The study of the requirements for the quality of canned fish.

2. Familiarization with the basic principles of the production of canned fish for baby food; analysis of the influence of technological factors on the quality of canned fish. Innovation in production.

3. Drawing up technological schemes for the production of canned food; experimental determination of the mass fraction of moisture, fat and protein in canned food, comparison with theoretical data, calculation of the nutritional value of canned food.

To participate in the discussion of the topic of the round table, students should be familiar with the basics of the production of specialized products, the

concepts of enrichment of products, functional ingredients; requirements for raw materials and food components.

The round table is aimed at consolidating the knowledge gained by students, as well as the ability to conduct a discussion.

During the round table, students draw up technological schemes.

Lesson 7. «Calculation of the biological value and fatty acid composition of products for gerodietetic nutrition»

Points for discussion:

1. The development of calculation methods for determining the mass fraction of protein, based on its amino acid composition and mass fraction of fat, based on its fatty acid composition.

2. Acquaintance with calculation methods for determining the biological value of products for gerodietetic nutrition.

3. Calculation of the amino acid and fatty acid composition of products for baby food; comparing the data with an “ideal” protein and an “ideal” fat.

5. TRAINING AND METHODOLOGICAL SUPPORT OF STUDENTS'S INDEPENDENT WORK

Educational and methodological support for students' independent work in the discipline "Biotechnology for the production of specialized food products / Biotechnology for the production of specialized food products" 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.

6. 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. Specialized Food	SPC-11 SPC-14 SPC 17 SPC-18 SPC-19	Knows how to organize and conduct the technological process within the framework of the technology for the production of biotechnological products adopted in the organization	UO-1 - interview, UO-2 - colloquium, PR-4 – abstract	Exam Questions 1-76 Pr-1 - final test
2	Topic 2. Functional ingredients used in biotechnology specialized food products		Able to apply methods of organizing and conducting a technological process within the framework of the technology for the production of biotechnological products adopted in the organization		
3	Topic 3. Lecture-discussion (MAO): Specialized nutrition for various population groups		Owns methods of organizing and conducting the technological process within the framework of the technology for the production of biotechnological products adopted in the organization		

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

7. LIST OF TRAINING LITERATURE AND INFORMATION AND METHODOLOGICAL SUPPORT OF DISCIPLINE

Main literature

(electronic and print editions)

1. Food ingredients in the creation of modern food / [ed. V.A. Tutelyan, A.P. Nechaev]. Moscow: DeLi Plus, 2014 .-- 519 p. (2 copies).
<http://lib.dvfu.ru:8080/lib/item?id=chamo:732001&theme=FEFU>

2. Technology of products of therapeutic and prophylactic use on a milk basis: a textbook for universities / N. A. Tikhomirova. St. Petersburg: Trinity Bridge, 2010. (5 copies).447 p.

<http://lib.dvfu.ru:8080/lib/item?id=chamohaps58444&theme=FEFU>

3. Biotechnology of combined foods based on dairy and microbiological raw materials: method. directions to the lab. works for students special. 240902 "Food biotechnology" of all forms of education / comp. N.V. Xitun, E.S. Fishchenko. Biotechnology of dairy production, Vladivostok: Publishing House of the Pacific Economic University, 2009. - 96 p. (8 copies).

<http://lib.dvfu.ru:8080/lib/item?id=chamo:357087&theme=FEFU>

4. Biotechnology: a textbook for high schools / S.M. Klunova, T.A. Egorova, E.A. Zhivukhina, Moscow: Academy, 2010 .-- 256 p. (5 copies)

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

Additional literature

(electronic and print editions)

1. Food biotechnology products from raw materials of plant origin: Textbook. / O.A. Neverova, A.Yu. Prosekov et al. - M.: SIC INFRA-M, 2014 .-- 318 p.: 60x90 1/16 ISBN 978-5-16-005309-7.

<http://znanium.com/go.php?id=363762>

2. Basic principles of processing raw materials of plant, animal, microbiological origin and fish: method. directions for students special. 240902 "Food biotechnology" of all forms of education / comp. E.V. Makarova, Vladivostok: Publishing House of the Pacific Economic University, 2009. - 80 p. (10 copies) <http://lib.dvfu.ru:8080/lib/item?id=chamo:356130&theme=FEFU>

Regulations

1. GOST 13207-85. Food ration for lifeboats and rafts of sea vessels. Technical specifications

2. GOST 30625-98. Liquid and pasty dairy products for baby food. General specifications.

3. GOST 30626-98. Dry milk products for baby food. General specifications.
4. GOST 30650-99. Canned poultry for baby food. General specifications.
5. GOST R 51172-98. Concentrates are food. Treatment and preventive cereals for baby food. Technical conditions
6. GOST R 51187-98. Semi-finished meat products chopped, dumplings, minced meat for baby food. General specifications.
7. GOST R 51770-2001. Canned meat products for nutrition of young children. General specifications
8. GOST R 52198-03. Canned meat and vegetable products for nutrition of young children. Technical conditions
9. GOST R 52199-03. Canned meat (class A). Baby meat puree. Technical conditions
10. GOST R 52306-05 Poultry meat (carcasses of chickens, broiler chickens and their cut parts) for baby food. Technical specifications
11. GOST R 52479-05. Cooked meat sausages for baby food. General specifications

8. METHODOLOGICAL INSTRUCTIONS FOR THE DEVELOPMENT OF THE DISCIPLINE

The theoretical part of the discipline “Biotechnology for the production of specialized food products” is revealed at the lecture classes, since the lecture is the main form of training, where the teacher gives the basic concepts of the discipline.

The sequence of presentation of the material at the lecture classes is aimed at forming an indicative basis for students for the subsequent assimilation of the material during independent work.

In practical classes during discussions at seminars and in discussing essays, students learn to analyze and predict the development of technology of specialized food products in various applications as a science, and reveal its scientific and social problems.

Practical classes of the course are held in all sections of the curriculum. Practical work is aimed at developing students' independent research work skills. During practical classes, the student performs a set of tasks that allows you to consolidate lecture material on the topic under study, to obtain basic skills in various fields of discipline. Active consolidation of theoretical knowledge is facilitated by the discussion of the problematic aspects of the discipline in the form of a seminar and practical exercises. At the same time, the skills of independent research activity are developed in the process of working with scientific literature, periodicals, the formation of the ability to defend one's point of view reasonably, listen to others, answer questions, and lead discussions.

When writing essays, it is recommended that you independently find the literature for it. The abstract reveals the content of the investigated problem. Work on the essay helps to deepen understanding of individual issues of the course, to form and defend your point of view, to acquire and improve independent creative work skills, to conduct active cognitive work.

The main types of independent work of undergraduates is work with literary sources and methodological recommendations for studying the technology of specialized food products, Internet resources for more in-depth familiarization with certain problems of the technology of specialized products. The results of the work are drawn up in the form of abstracts or reports with subsequent discussion. Topics of essays correspond to the main sections of the course.

To conduct ongoing monitoring and intermediate certification, several oral interviews and test-control works are carried out.

9.MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Material and technical support for the implementation of the discipline includes classrooms for lectures and practical classes, equipped with multimedia equipment, and corresponding to sanitary and fire safety standards.

Name of equipped premises	List of main equipment
Laboratory of General Food Biotechnology	Training furniture for 25 workplaces, teacher's place (table, chair). Analytical and technological equipment (M311): Milk centrifuge

<p>Vladivostok, about. Russian p. Ajax 10, Building 25.1, aud. M 311. The classroom for lectures, practical and laboratory classes, group and individual consultations, ongoing monitoring and interim certification.</p>	<p>with heating IJIM 1-12; Liquid thermostat LOIP Lt-208a, volume 8l, 120x150 / 200mm; Analyzer of milk quality Lactan 1-4 mod. 230; PH-millivoltmeter with tripod pH-150MI; VSP 1.5-2-3T scales; Refrigerator "Ocean-RFD-325B"; Drying cabinet, stainless steel chamber. steel, 58l; electric stove 111CH 101-226589; PE-6110 magnetic stirrer with heating; VNZh-0,3-KhS3 viscometer (d-1.41) glass capillary; Tripod PE-2710 lab. for burettes.</p> <p>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.</p>
<p>Independent work</p>	
<p>Computer class Vladivostok, about. Russian p. Ajax 10, Building 25.1, aud. M621. The classroom for lectures, practical exercises, group and individual consultations, ongoing monitoring and interim certification.</p>	<p>Training furniture for 17 workplaces, teacher's place (table, chair). 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).</p>
<p>Reading rooms of the FEFU Scientific Library with open access to the fund (building A - level 10)</p>	<p>Reading room equipment of the FEFU Scientific Library: HP All-in-One 400 All-in-One Monoblock 400 19.5 (1600x900), Core i3-4150T, 4GB DDR3-1600 (1x4GB), 1TB HDD 7200 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</p>

10. VALUATION FUNDS

Code and wording of competency	Competency Stages	
<p>SPC-11 ability to provide technological discipline, sanitary and hygienic mode of operation of the enterprise, the content of technological equipment in proper technical condition</p>	<p>Knows</p>	<p>technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition</p>
	<p>Is able</p>	<p>ensure technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition</p>
	<p>Owns</p>	<p>skills to ensure technological discipline, sanitary and hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition</p>

SPC-14 ability to use standard and develop new methods of engineering calculations of technological parameters and equipment of biotechnological production	Knows	typical and new methods of engineering calculations of technological parameters and equipment of biotechnological productions
	Is able	use standard and develop new methods for engineering calculations of technological parameters and equipment for biotechnological production
	Owens	skills in using standard and developing new methods for engineering calculations of technological parameters and equipment for biotechnological production
SPC-17 readiness to conduct pilot technology development and process scaling	Knows	pilot testing of technology and scaling of processes
	Is able	carry out pilot testing of technology and scaling of processes
	Owens	skills in conducting pilot testing of technology and scaling up processes
SPC-18 ability to develop and scientifically substantiate optimal integrated certification schemes for biotechnological products	Knows	схемы оптимальной комплексной аттестации биотехнологических продуктов
	Is able	вырабатывать и научно обосновывать схемы оптимальной комплексной аттестации биотехнологических продуктов
	Owens	навыками выработки и научного обоснования схем оптимальной комплексной аттестации биотехнологических продуктов
SPC-19 ability to analyze the performance of the process for compliance with the initial scientific developments	Knows	schemes for optimal comprehensive certification of biotechnological products
	Is able	develop and scientifically substantiate schemes for optimal integrated certification of biotechnological products
	Owens	skills in developing and scientific substantiation of schemes for optimal integrated certification of biotechnological products

I. Evaluation tools for intermediate certification

Interim certification includes the student's answer to the questions for the classification and passing the final test.

Student grading criteria

Points (rating)	Pass / Exam Assessment (standard)	Requirements for formed competencies
100-85	Set off / excellent	The student is rated as “excellent” if he has deeply and firmly grasped the program material, sets out it comprehensively, consistently, clearly and logically in order, knows how to closely relate theory to practice, freely copes with tasks, questions and other types of application of knowledge, and does not have difficulty 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.
84-75	"Set off" / "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
74-61	"Set off" / "satisfactory"	A student is rated "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 sequence in the presentation of program material, and has difficulty performing practical work.
60-0	"Not set off" / "unsatisfactory"	Evaluation of "unsatisfactory" is given to a student who does not know a significant part of the program material, makes significant mistakes, hesitates, with great difficulty performs practical work. As a rule, grades are given to students who cannot continue their studies without additional classes in the relevant discipline.

Students' independent work consists of preparing for practical classes, working on recommended literature, writing reports on the topic of a seminar, 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 carries out an analysis of the practice).

Tasks for self-fulfillment

1. A literature review should be carried out on a given topic of MAO. Based on the developed material, the topic should be prepared and presented for discussion.

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

3. Preparation of presentations using multimedia equipment.

Methodological instructions for the abstract

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 course project, which is a comprehensive study of the problem, the essay is aimed at analyzing one or more scientific papers.

The objectives of writing an abstract 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

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 abstract 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 essays

1. Identification and molecular genetic characteristics of probiotic microorganisms. Molecular mechanisms of action of probiotics.
2. Nutraceuticals and special foods.
3. Nutrition problems of healthy and sick people: trophology, therapeutic, functional and supportive nutrition, biologically active food supplements (BAA) in clinical and nutritional practice.
4. Safety assessment of probiotic preparations and food products.
5. Technological aspects of creating flour confectionery for special purposes.
6. Microbiological criteria and methods for assessing the quality and safety of specialty confectionery.
7. Food concentrates for special purposes. New recipes, technologies, characteristics of consumer properties.
8. Sugar confectionery for special purposes, new recipes, technologies, characteristics of consumer properties.
9. Development of the range of preventive and medical - diet bakery products for special purposes.
10. Gluten-free flour confectionery for preventive and therapeutic nutrition.
11. Diet therapy for celiac disease: the role of gluten-free products.
12. Modern approaches to the organization of diet therapy for galactosemia in children.
13. Specialized therapeutic food products: characteristics and applications for young children.
14. Specialized food products for submarine crews: characteristics, technology features.

15. Specialized food products for food on board an aircraft: characteristics, technology features.
16. Specialized food products for mine rescuers: characteristics, technology features.
17. Specialized food products for miners: characteristics, technology features.
18. Specialized food products for military personnel: characteristics, technology features.
19. Specialized food products for lifeboats and rafts of marine vessels: characteristics, technology features.
20. Technological aspects of the production of specialized products with natural radioprotectors.
21. Directions in the creation of herodietic products.
22. Specialized food products for astronauts: characteristics, technology features.

Set-off questions

1. Nutrition problems of modern man. Reasons, solutions.
2. Nutritional status of the population of Russia. Problems, solutions.
3. Nutrition policy. Analysis of recent changes.
4. Power optimization. Methods of solution, their characteristics.
5. Comparative characteristics of the types of food.
6. Functional nutrition. Characterization, application, relevance.
7. The need and rationing of proteins in nutrition.
8. Characterization of the most important protein (standard) amino acids.
9. Carbohydrates. Classification, structure, use in specialized nutrition.
10. Dietary fiber. Classification, structure, use in specialized nutrition.
11. Lipids. Classification, structure, use in specialized nutrition.
12. Vitamins. Classification, structure, use in specialized nutrition.

13. Safe level of micronutrient intake per day. Examples. Violations, effects on the body.
14. Development of special-purpose products: a systematic approach.
15. Development of specialty products: an innovative approach.
16. General requirements for assessing the quality and safety of special products.
17. Identification of specialty products.
18. The procedure for the examination of special products.
19. Evaluation of the preventive effectiveness of special products.
20. The importance of dietary supplements in adjusting nutrition and public health.
21. The qualitative composition of dietary supplements. Characteristic. Examples.
22. The quantitative composition of dietary supplements. Characteristic. Examples.
23. Nutraceuticals. Characteristics, examples, effects on the body.
24. Parapharmaceuticals. Characteristics, examples, effects on the body.
25. Probiotics. Characteristics, examples, effects on the body.
26. State control over the production and sale of dietary supplements.
27. Physiological restructuring of the metabolism of pregnant and lactating women.
28. The need for energy and nutrients during pregnancy.
29. The need for energy and nutrients in lactation.
30. Specialized products for dietetic and therapeutic nutrition. pregnant women: technology features.
31. Specialized products for the dietary and therapeutic nutrition of pregnant women: assortment.
32. Baby food: assortment.
33. Providing children and adolescents with nutrients and energy.
34. Providing children and adolescents with nutrients and energy.

35. Food groups for healthy and sick children of different ages.
36. Nutritional value of baby food.
37. Dairy-based baby food.
38. Meat and fish based baby food.
39. Grain-based baby food.
40. Baby food based on fruits and vegetables.
41. Identification and examination of baby food.
42. Food for the elderly and senile.
43. The need for nutrients and energy of the elderly.
44. The need for minerals of the elderly.
45. The organization of a balanced diet of the elderly and senile.
46. Directions in the creation of herodietic products. The choice of raw materials.
47. Classification of products for the elderly and senile.
48. Herodietic products based on milk and bacterial starter cultures.
49. Herodietic products based on grain raw materials.
50. Herodietic products based on meat and fish raw materials.
51. The basic principles of a balanced diet of athletes.
52. Classification of products for sports nutrition.
53. Technology drinks for sports nutrition.
54. Food astronauts. Range. Features of production.
55. Technological developments of space food products.
56. Product quality requirements for astronauts.
57. Food products on board the aircraft.
58. Nutrition rescuers on duty and during the liquidation of accidents in mines.
59. Food for diabetics. Features of technology.
60. Classification of dietary products.
61. Features of the production of dietary products.
62. Food ration for lifeboats and rafts of sea vessels.

63. Products with sweeteners and sweeteners for patients with diabetes.
64. Products with a low content of sodium chloride or without it.
65. Products with high nutritional value.
66. Canned food for the dietary and preventive nutrition of adults.
67. Problems of overweight and obesity, products for correcting body weight.
68. Therapeutic and preventive nutrition. Characteristic, features.
69. Tasks and basic principles of food fortification with micronutrients.
70. Features of the development and evaluation of the quality of enriched products.
71. Categories of fortified foods. Examples, characteristic.
72. Therapeutic and dietary products enriched with vitamins.
73. Treatment, prophylactic and dietary products enriched with minerals.
74. Products for patients with celiac disease. Assortment, production features.
75. Special food products for the correction of technogenic effects on the body.
76. Lactose-free dairy products. Assortment, production features.

Final test

VARIANT 1

Task 1. What are the names of food products with a given chemical composition due to the enrichment, elimination or substitution of macro- and micronutrients with other food components for various categories of the population - food products for athletes, lactating and pregnant women, elderly people, children, etc.?

- a) Natural foods.
- b) Specialized food products.
- c) Non-traditional food products.
- d) Alimentary food products.

Task 2. Vitaminization of ready meals in institutions for children and adolescents is carried out:

- a) ascorbic acid added to all dishes in the autumn-winter period;
- b) ascorbic acid, added to three dishes in the autumn-winter period;
- c) multivitamin preparations added to all dishes in the autumn-winter period;
- d) ascorbic acid added to cold liquid dishes year-round.

Task 3. What is the fundamental regulatory document governing the turnover of specialized food products in the Russian Federation?

- a) Technical regulation of the Customs Union 027/2012 "On the safety of certain types of specialized food products, including dietary therapeutic and preventive dietetic nutrition."
- b) Technical regulation of the Customs Union 033/2013 "On the safety of milk and dairy products."
- c) GOST 34006-2016 "Specialized food products. Food products for nutrition of athletes. Terms and Definitions".
- d) GOST R 52349-2005 "Food products. Functional food products. "

Task 4. In which section of the gastrointestinal tract is the breakdown of fats in adults?

- a) the oral cavity
- b) the large intestine;
- c) the stomach
- d) the small intestine
- e) the esophagus

Task 5. A functional food ingredient (FFI) can be considered as such if it satisfies the requirement:

- a) The content of FFI in the food product should be at least 15% of the recommended daily physiological requirements.
- b) The content of FFI in the food product should be at least 30% of the recommended daily physiological requirements.
- c) The content of FFI in the food product should be at least 40% of the recommended daily physiological requirements.
- d) The content of FFI in the food product should be at least 50% of the recommended daily physiological requirements.

Task 6. The main metabolic effect, which is achieved by a diet with a reduced amount of carbohydrates and an increase in lipotropic substances:

- a) increased use of glucose for the synthesis of fat in adipose tissue;
- b) a decrease in the oxidation of fatty acids in the liver;
- c) increased use of glucose for the synthesis of fat in the liver;
- d) an increase in the synthesis of phospholipids and a decrease in the deposition of neutral fat in the liver;
- d) a decrease in the synthesis of phospholipids.

Task 7. What foods do you need to include in the student's diet for the prevention of osteopenia?

- a) chicken egg d) milk, dairy products
- b) butter e) cereal
- c) fishdishesf) meatdishes

Task 8. Compare which monosaccharides are part of the following compounds:

- 1. Glucose + glucose. a) lactose
- 2. Glucose + fructose. b) maltose
- 3. Galactose + glucose. c) sucrose
- 4. Fructose + glucose + galactose. d) raffinose

Task 9. The biological role of fats is that they:

- a) are a source of B vitamins;
- b) are a source of energy, phosphates, fatty acids and fat-soluble vitamins;
- c) are a source of vitamins C and PP;
- d) are sources of minerals.

Task 10. Which of the following substances inhibit the absorption of iron from the gastrointestinal tract?

- a) fruit acids c) vitamin C
- b) phosphates, oxalates, calcium; d) tannic acid

VARIANT 2

Task 1. The solubility of proteins in the aquatic environment is determined by:

- a) ionization of a protein molecule;
- b) hydration of protein molecules upon dissolution;
- c) the shape of the protein molecule;
- d) the ability to bind natural ligands.

Task 2. Select the correct answer. Oxygen free radicals:

- a) stimulate bond breaks in nucleic acid molecules;
- b) damage unsaturated fatty acids of cell membranes;
- c) inhibit the synthesis of prostaglandins;
- d) carry out the immune defense of the body;
- e) contribute to the formation of crosslinks and disruption of the functioning of proteins;
- f) inhibit the processes of neutralization of xenobiotics in the liver.

Task 3. A patient with a fatty liver is prescribed a vegetable-milk diet. What lipotropic substances deficiency make up the recommended products?

- a) unsaturated fatty acids
- b) saturated fatty acids
- c) creatine
- d) methionine
- e) serotonin
- f) calcitonin

Task 4. To wash the dishes in the food unit in educational institutions should have a washing bath:

- a) 3-female
- b) 4-female
- c) 2-female

Task 5. In which product is the maximum phosphorus content:

- a) soybeans
- b) cheese
- c) beans
- d) flounder

Task 6. Arrange the cereals as their calcium content decreases:

- a) buckwheat
- b) oat;
- c) millet
- d) pearl barley

Task 7. The substances with a protective function against microorganisms include:

- a) volatile;
- b) retinol, tocopherol, etc .;
- c) vitamins A, P, E of group B;
- d) sterols, sterols.

Task 8. What is the name of specialized food products designed to correct carbohydrate, fat, protein, vitamin and other types of metabolism, as well as food products designed to reduce the risk of developing diseases?

- a) Dietary preventive food products.
- b) Functional food products.
- c) Dietary medical food products.
- d) Herodietic food products..

Task 9. The amount of iron that must be obtained with food to cover physiological needs, depending on age (compare data):

- 1) age 1-3 years a) 18 mg / day
- 2) 4-10 years b) 1 mg / kg / day
- 3) 11-20 years c) 10 mg / day

Task 10. What foods are recommended for iron deficiency?

- a) meat c) cottage cheese
- b) fruits, vegetables d) all of the above

VARIANT 3

Task 1. What functions are inherent only in proteins?

- a) energy c) buffer
- b) catalytic d) structural

Task 2. What forms of nutrition are specialized species?

- a) Dietary therapeutic and dietary preventive nutrition.
- b) Nutrition of an average person.
- c) Sports nutrition, nutrition of pregnant and lactating mothers, functional nutrition.
- d) Baby food.

Task 3. In which product is the maximum calcium content:

- a) soybean
- b) cheese
- c) cottage cheese
- d) beans

Task 4. A functional food product can be considered if the following conditions are met:

- a) The product is enriched with vitamins, minerals, dietary supplements.
- b) The product has a unique manufacturing technology.
- c) The product has undergone chemical or biological changes.
- d) A product enriched with biologically active substances with scientifically sound and proven properties that reduces the risk of developing nutritional diseases.

Task 5. What components of bile are involved in the digestion of fats?

- a) higher saturated fatty acids
- b) cholesterol and its esters
- c) salts of bile acids
- d) pancreatic lipase
- e) diacylglycerols
- f) pancreatic α -amylase

Task 6. What is the name of the set of characteristics or properties of a functional food product (FFP), which provides a reduction in the risk of developing diseases associated with nutrition, and replenishment, as well as preventing nutritional deficiencies, maintaining and improving health?

- a) The significance of the FFP.
- b) The effectiveness of the FFP.
- c) The validity of the FFP.

Task 7. What is the name of specialized food products with a given nutritional and energy value, physical and organoleptic properties, and intended for use as part of therapeutic diets?

- a) Dietary preventive food products.
- b) Functional food products.
- c) Dietary medical food products.

d) Herodietic food products.

Task 8. In a patient suffering from enterocolitis, after milk intake appeared diarrhea, colic, flatulence. What enzyme deficiency is this related to?

- a) amylases;
- b) sucrose
- c) lactases
- d) maltases
- e) glycogen synthetase

Task 9. What is the name of specialized food products of a given chemical composition, increased nutritional value and directed efficiency, which has a specific effect on increasing a person's adaptive capabilities to physical and neuro-emotional stress?

- a) Food products for nutrition of athletes.
- b) Food products for pregnant and lactating women.
- c) Food products for gerodietetic nutrition.
- d) Food products for baby food.

Task 10. What is the name of the food product of dietary therapeutic or preventive dietetic food, in which the content of easily digestible carbohydrates (monosaccharides and disaccharides) is absent or reduced relative to their content in similar food products and (or) the carbohydrate composition is changed?

- a) Food products for nutrition of athletes.
- b) Food products for pregnant and lactating women.
- c) Food products for gerodietetic nutrition.
- d) Food products of diabetic nutrition.

II. 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, regulatory information are given. 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 are 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 disclosed problem and in the design of the work.

Questions for colloquiums, interviews in the discipline

"Biotechnology for the production of specialized food products"

Section I. Specialized Food

1. Types of food. The role of nutrition in maintaining health. Functions and biological effects of food.
2. Functional ingredients used in biotechnology specialized food products
3. Specialized nutrition for various population groups

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 are 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.