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

ШКОЛА БИОМЕДИЦИНЫ

«СОГЛАСОВАНО»

Руководитель ОП

_____ Каленик Т.К.
(подпись) (Ф.И.О. рук. ОП)

«12» июля 2018 г.

«УТВЕРЖДАЮ»

Директор Департамента
пищевых наук и технологий

_____ Ю.В. Приходько
(подпись) (Ф.И.О.)

«12» июля 2018 г.

УЧЕБНО-МЕТОДИЧЕСКИЙ КОМПЛЕКС ДИСЦИПЛИНЫ

Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Направление подготовки 19.04.01 Биотехнология

Магистерская программа «Agri-Food Biotechnology»

Форма подготовки очная

курс ___1____ семестр ___1_____
лекции __18_ час.
практические занятия___18___час.
лабораторные работы_____час.
в том числе с использованием МАО лек.___4_/пр.__8___/лаб._____ час.
всего часов аудиторной нагрузки_____36___ час.
в том числе с использованием МАО __12___ час.
самостоятельная работа ___72_____ час.
в том числе на подготовку к экзамену __36___ час.
курсовая работа / курсовой проект __-_____ семестр
зачет _____ семестр
экзамен 1 -семестр

Учебно-методический комплекс составлен в соответствии с требованиями образовательного стандарта, самостоятельно устанавливаемого ДВФУ, утвержденного приказом ректора от 07.07.2015 № 12-13-1282.

УМКД обсужден на заседании Департамента пищевых наук и технологий Школы биомедицины ДВФУ протокол № 1 от «11» июля 2018 г.
Директор ДПНиТ д.т.н., профессор Приходько Ю.В.
Составитель (ли): Моткина Е.В., Киселева М.В.

ANNOTATION
of the educational complex of discipline
Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства
Direction of preparation: 19.04.01 Biotechnology
Educational program: "Agri-Food Biotechnology"

The educational-methodical complex of the discipline “Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства” was developed for 1st year students and relates to its variable part (elective discipline) in the direction 19.04.01 “Biotechnology” master's program “Agri-Food Biotechnology” in accordance with the requirements of the FEFU OS in this direction and the regulation on educational-methodical complexes of disciplines of educational programs of higher professional education (approved by order of the rector of the FEFU dated 04.17.2012 No. 12-13-87).

The discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства is included in the variable curriculum.

The total complexity of mastering the discipline is 108 hours. The curriculum includes lecture classes (18 hours), practical classes (18 hours), independent work of the student (36 hours). Discipline is implemented on 1 course in 1 semester.

The purpose of the discipline is to teach the student to apply knowledge about biotechnological process control systems to solve typical professional problems of biotechnology.

The task of the discipline: the formation of the necessary knowledge base for analysis, identification and solution of issues related to the specifics of biotechnological processes and work with biotechnology objects.

The discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства is logically and meaningfully connected with such courses as "Modern trends in the development

of biotechnology", "Methodology of scientific research in biotechnology", "Administration and management of agriculture and the agro-industrial complex".

biotechnology", "Chemistry".

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 _____Ю.В. Приходько

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

ШКОЛА БИОМЕДИЦИНЫ

«СОГЛАСОВАНО»
Руководитель ОП
_____ Каленик Т.К.
(подпись) (Ф.И.О. рук. ОП)
«12» июля 2018 г.

«УТВЕРЖДАЮ»
Директор Департамента
пищевых наук и технологий
_____ Ю.В. Приходько
(подпись) (Ф.И.О.)
«12» июля 2018 г.

РАБОЧАЯ ПРОГРАММА УЧЕБНОЙ ДИСЦИПЛИНЫ

Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Направление подготовки 19.04.01 Биотехнология

магистерская программа «Agri-Food Biotechnology»

Форма подготовки очная

курс 1 семестр 1
лекции 18 час.
практические занятия 18 час.
лабораторные работы _____ час.
в том числе с использованием МАО лек. 4 /пр. 8 /лаб. _____ час.
всего часов аудиторной нагрузки 36 час.
в том числе с использованием МАО 12 час.
самостоятельная работа 72 час.
в том числе на подготовку к экзамену 36 час.
курсовая работа / курсовой проект -_____ семестр
зачет _____ семестр
экзамен 1 -семестр

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 Школы биомедицины ДВФУ протокол № 1 от «11» июля 2018 г.
Директор Департамента Ю.В. Приходько

Директор ДПНиТ д.т.н., профессор Приходько Ю.В.
Составитель (ли): Моткина Е.В., Киселева М.В.

Оборотная сторона титульного листа РПУД

I. Рабочая программа пересмотрена на заседании Департамента:

Протокол от «_____» _____ 20___ г. № _____

Директор Департамента _____ _____
(подпись) (И.О. Фамилия)

II. Рабочая программа пересмотрена на заседании Департамента:

Протокол от «_____» _____ 20___ г. № _____

Директор Департамента _____ _____
(подпись) (И.О. Фамилия)

Annotation to the work program of the discipline
Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

The work program of the discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства is designed for 1st year students and relates to its variable part (elective discipline) in the direction 04.19.01 "Biotechnology" master's program "Agri-Food Biotechnology" in accordance with the requirements of the FEFU OS in this direction and the regulation on educational-methodical complexes of disciplines of educational programs of higher professional education (approved by order of the rector of the FEFU dated 04.17.2012 No. 12-13-87).

The discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства is included in the variable curriculum.

The total complexity of mastering the discipline is 108 hours. The curriculum includes lecture classes (18 hours), practical classes (18 hours), independent work of the student (36 hours). Discipline is implemented on 1 course in 1 semester.

The purpose of studying the discipline is to teach the student to apply knowledge about control systems of Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства.

Objectives of the discipline: the formation of the necessary knowledge base for analysis, identification and resolution of issues related to the specifics of biotechnological processes and work with biotechnology objects.

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

Code and wording of competency	Competency Stages	
PK-9 willingness to use the basic principles of organization of metrological support of	Knows	basic principles of organizing metrological support for the production of agricultural raw materials and food products
	Is able	To use the basic principles of organizing metrological support for the production of agricultural raw materials

production		and food products
	Owns	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products
PK-10 Ability to develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	Knows	principles for developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
	Is able	develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
	Owns	the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
PK-16 the ability to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control	Knows	operation of control, automation and automated production control, chemical-technical, biochemical and microbiological controls
	Is able	to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control
	Owns	knowledge of the operation of controls, automation and automated production management, chemical-technical, biochemical and microbiological control
PK-17 willingness to conduct pilot development of technology and process scaling	Knows	rules for pilot development of technology and process scaling
	Is able	Pilot technology development and process scaling
	Owns	Knowledge in pilot development of technology and process scaling
PK-19 ability to analyze technological process indicators for compliance with initial scientific developments	Knows	process indicators for compliance with initial scientific developments
	Is able	analyze the performance of the technological process for compliance with the original scientific developments
	Owns	ability to analyze technological process indicators for compliance with initial scientific developments

I. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE (18 H)

Topic 1. Introduction to the discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Classification of equipment and production lines of food biotechnology products. The historical background of the emergence of continuous production. Synchronization of equipment in the production line. Fundamentals of the theory of reliability of production lines. Transporting systems of hardware production lines.

Topic 2. Choice of instrumentation and technological control parameters in the processes of production of food biotechnology products

Moisture measurement in food manufacturing processes. Process control of food processing. Hydromechanical and mechanical processes of food biotechnology.

Topic 3. Hardware - technological lines of bakery, pasta, confectionery and yeast production

Instrumentation and technological line for the production of bread from wheat flour. Instrument-technological scheme for the preparation of hearth bread from rye or a mixture of rye and wheat flour with a large thick sourdough. Instrument-technological lines for the production of flour confectionery. Hardware and technological lines for the production of lamb products. Equipment and technological lines for the production of confectionery products, including: chocolate, halva, pastel-marmalade products, caramels. Hardware and technological lines for the production of pasta. Hardware and technological lines of yeast production.

Topic 4. Hardware - technological lines of the fish processing industry

Hardware - technological line for the production of canned fish. The principle of operation of the autoclave park. Hardware - technological line for the production of fish preserves. Hardware - technological line for the production of dried, dried, smoked fish products. Hardware - technological line for the production of analogue fish products. Hardware - technological line for the production of fishery fish products.

Topic 5. Hardware - technological lines of the meat processing industry

Instrument-technological lines for the production of sausages. Equipment and production lines for the production of semi-finished products. Hardware - technological line for the production of canned meat.

Topic 6. Hardware - technological lines of the dairy industry

Hardware - technological line for the production of drinking milk. Hardware - technological lines for the production of condensed and dry dairy products. Hardware - technological lines for the production of fermented milk drinks and products. Hardware technological ice cream production lines.

Topic 7. Hardware - technological lines of starch and syrup production

Topic 8. Hardware - technological lines for the processing of malt and beer

Hardware - technological lines for the production of alcohol and vodka. Hardware and technological lines for the production of malt and beer. Hardware technological lines for the production of kvass. Hardware technological juice production lines. Hardware-technological lines for the production of soft drinks.

Topic 8. Hardware - technological lines of production of biologically active substances from raw materials of animal origin

Hardware - technological line for the production of polysaccharides from algae. Instrument - technological line for the production of PUFAs, fat-soluble vitamins, medical fat from hydrobionts.

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

Practical classes (36 h.)

Practical work 1. Methodology for calculating raw materials, auxiliary packaging materials in the fishing industry

Practical work 2. Methodology for calculating raw materials, auxiliary packaging materials in the meat industry.

Practical work 3. Methodology for calculating raw materials, auxiliary packaging materials in the baking industry

Practical work 4. Methodology for calculating raw materials, auxiliary packaging materials in the dairy industry

Practical work 5. Methodology for calculating raw materials, auxiliary packaging materials in the confectionery industry

Practical work 6. Methodology for calculating the required amount of equipment of periodic and continuous operation at a given performance

Practical work 7. Automatic control and management of biotechnological processes

Practical work 8. Fundamentals of product calculations in the production of culinary products from aquatic organisms

Practical work 9. Fermenters and fermentation plants for the cultivation of microorganisms

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

Educational and methodological support for the independent work of students in the discipline "Methods of biomodification of raw materials" 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 1. Computer modeling of biotechnological processes and systems	PK-9; PK-10; PK-16; PK-17; PK-19	Knows: the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	UO-1 - interview, UO-2 – colloquium	Exam
			Able: to use the basic principles of organization of metrological support for the production of agricultural raw materials and food products		
			Owns: skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products		
2	Section 2. Examples of computer modeling of the simplest typical biotechnological processes and systems	PK-9; PK-10; PK-16; PK-17; PK-19	Knows: the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international	UO-1 - interview, UO-2 - colloquium, PR-4 – essay	exam

			quality standards		
			Able: to develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards		
			Owns: the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards		

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

1. Microbiological control of biotechnological production: a textbook for universities / N. B. Gradova, E. S. Babusenko, V. I. Panfilov [and others].

Moscow: DeLi Plus, 2016 .-- 139 p. http://lib.dvfu.ru:8080/lib/item?id=chamo:838315&theme=FEFU

2. Microbiological synthesis / A. M. Bezborodov, G. I. Kvesitadze; [resp. ed. A. G. Lobanok]. St. Petersburg: Prospect of Science, 2011 .-- 143 p. http://lib.dvfu.ru:8080/lib/item?id=chamo:785480&theme=FEFU

3. Biotechnology: a textbook for agricultural universities / V. A. Chkhenkeli. St. Petersburg: Prospect of Science, 2014 .-- 335 p. http://lib.dvfu.ru:8080/lib/item?id=chamo:785504&theme=FEFU

4. Lubentsova E.V. Synthesis of automatic control systems for biotechnological processes using approximating and neuro-fuzzy control methods [Electronic resource]: monograph / Lubentsova EV, Volodin AA - Electron. textual data. — Stavropol: North Caucasus Federal University, 2014.— 160 c .— Access mode: http://www.iprbookshop.ru/63132.html

5. Belyaev P.S. Process Control Systems [Electronic resource]: a manual for students of the 3rd and 4th year of study in the areas of training 151000, 222900, 240100, 240700, 241000, 261700 / Belyaev PS, Bukin AA - Electron. textual data. — Tambov: Tambov State Technical University, EBS DIA, 2014.— 156 p. http://www.iprbookshop.ru/64575.html

6. Reshetnyak EP Chemical-technological process control systems [Electronic resource]: lecture notes for students of the Biotechnology specialty / Reshetnyak EP - Electron. textual data. - Saratov: Saratov State Agrarian University named after N.I. Vavilova, Higher education, 2009.— 213 p. http://www.iprbookshop.ru/8143.html

7. The journal “Bulletin of the Voronezh State University of Engineering Technologies” (publishing house of the Voronezh State University of Engineering Technologies; RSCI) https://www.vestnik-vsuet.ru/vguit/issue/archive

8. International Journal of Food Science & Technology (John Wiley & Sons, Incorporated; Scopus, Web of Science, RSCI) https://elibrary.ru/contents.asp?titleid=2607

9. Calculation and design of machines and apparatus for food production: a textbook for high schools / A. N. Ostrikov, O. V. Abramov, G. V. Kalashnikov [and others]; [scientific ed. A. N. Ostrikov]. - St. Petersburg: RAPP, 2009. - 407 p. http://lib.dvfu.ru:8080/lib/item?id=chamo[57136&theme=FEFU

10. Design of automated production systems: a textbook for universities / V. L. Konyukh. Moscow: Course, Infra-M, 2014 .-- 310 p. http://lib.dvfu.ru:8080/lib/item?id=chamo:752780&theme=FEFU

Additional literature

1. Reshetnyak EP Chemical-technological process control systems [Electronic resource]: lecture notes for students of the Biotechnology specialty / Reshetnyak EP - Electron. textual data. - Saratov: Saratov State Agrarian University named after N.I. Vavilova, Higher education, 2009.— 213 p. http://www.iprbookshop.ru/8143.html

Regulatory Materials

1. RF. The laws. On amendments to the Federal Law "Technical Regulations for Milk and Dairy Products": Federal Law of July 22, 2010 No. 163-ФЗ // New Laws and Normative Acts. - 2010. - No. 31. - S. 31-80.

2. RF. The laws. Technical Regulations for Milk and Dairy Products: Federal Law of June 12, 2008 No. 88

3. RF. The laws. Technical regulation of the Customs Union "On food safety" TR CU 021/2011

4. GOST 25011-81 “Meat and meat products. Methods for determining protein".

5. Federal Law of the Russian Federation of June 12, 2008 N 88-ФЗ "Technical Regulations for Milk and Dairy Products"

6. GOST 31981-2013 Yoghurts. General specifications

7. GOST R 53104-2008 Catering services. The method of organoleptic assessment of the quality of catering products.

8. GOST 3624-92 Milk and dairy products. Titrometric methods for determining acidity

9. GOST 23327-98 Milk and dairy products. The method of measuring the mass fraction of total nitrogen according to Kjeldahl and determining the mass fraction of protein

10. GOST 3628-78 Dairy products. Sugar Determination Methods

11. GOST 10444.11-89 Food Products. Method for the determination of lactic acid microorganisms

12. GOST 9225-84 Milk and dairy products. Microbiological analysis methods

13. GOST R 52738-2007 Milk and milk processing products. Terms and Definitions

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 http database: //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/

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. M312, area 96.6 m2	Training furniture for 25 workplaces, teacher's place (table, chair), Analytical and technological equipment (M312): IRF-454 B2 M refractometer; Planix 5 Planimeter; PE-6110 magnetic stirrer with heating; Refrigerator "Ocean-RFD-325B"; Cooker Gorenie E52102 AW (for preparation and heat treatment of food products) 2 pcs.; Libra; Stainless steel distiller steel (5 l / h, power. 4,5 kW); Meat grinder "Unit-ugr-452"; Dishwasher Hansa ZIM416H; Moulinex HM 550 mixer (for grinding products) 101-277950; Blender BRAUN MX-2050; Tripod PE-2710

	lab. for burettes. Multimedia equipment: Monoblock Lenovo C360G-i34164G500UDK with Uninterruptible power supply Powercom SKP-1000A; 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. M621	Computer class: Training furniture for 17 workstations, 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 is provided with a system based on 802.11a / b / g / n 2x2 MIMO (2SS) access points.
Reading rooms of the FEFU Scientific Library with open access to the fund Vladivostok, Russian island, 10 Ajax, building A - level 10	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 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 m2	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)

Приложение 1

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

ШКОЛА БИОМЕДИЦИНЫ

УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ САМОСТОЯТЕЛЬНОЙ РАБОТЫ ОБУЧАЮЩИХСЯ

по дисциплине Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Направление подготовки: 19.04.01 «Биотехнология»

Магистерская программа: «Agri-Food Biotechnology»

Форма подготовки очная

Владивосток
2021

Schedule of independent work on the discipline

№	Date / Deadline	Type of independent work	Estimated time to complete	Form of control
1	1-5 week	Preparation of essays	9	Exam
2	6-7 week	Presentation preparation	9	Exam
3	8-9 week	Preparing for the colloquium	9	Exam
4	10-18 week	Preparing for the simulation game	9	Exam

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 of the simulation game, an analysis of the literature on the discipline under study should be carried out. Based on the developed material, an imitation game 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 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.

Presentation Topics

1. Current status and development trends of biotechnology and standardization methods.

2. Standardization as the basis of product safety

3. Innovative technologies in biotechnological production, specialized equipment for biotechnological production.

4. Integrated process control systems

5. Technical and economic analysis of biotechnological production systems.

6. Mathematical modeling of biotechnological processes and systems.

7. Classification of mathematical models their structure

8. Properties and basic definitions, the study of complex biotechnological systems.

9. The main stages of computer simulation.

10. Classification of biotechnological processes, the main features and differences from chemical-technological processes.

11. Fundamental models of the growth of microorganisms.

12. Assessment of the influence of various environmental factors on the kinetics of biotechnological processes.

13. Typical tasks arising in the synthesis and analysis of various nonlinear biotechnological processes and systems

Recommended topics and list of essays

1. The accumulation of metabolic products and changes in substrate concentration during biotechnological processes.

2. Substances that increase the shelf life of products.

3. Biological objects and raw material base

4. Cultivation of microorganisms and obtaining final products

5. Cultivation of microorganisms and obtaining final products

6. The Russian system of quality control of food production.

7. The principles of the HACCP system.

8. International standards for food and agricultural organization CAC / RSR.

9. Biotechnological process for the production of bread

10. Biotechnological method for the production of citric acid.

11. Biotechnological method of deep fermentation using mold Aspergillus niger.

Biotechnological method for the production of lactic acid.

a. Biotechnological method of producing paprika.

12. Biotechnological method for the synthesis of amino acids.

13. Biotechnological method for the production of feed lysine

14. Development of adaptive control algorithms for the process of cultivation of alcohol producers.

15. Fermentation process control algorithms.

16. Optimization of culture media and modes of cultivation of microorganisms using situational management algorithms.

17. The study of oxygen mass transfer in the processes of microbiological synthesis.

18. Study of the process of obtaining nutrient media for biotechnological production based on acid hydrolysates of plant waste.

19. Development of methods for the operative diagnosis of microbiological processes.

20. Development of an installation for measuring the benignity of plant waste hydrolysates as secondary material resources.

21. Intensification of the processes of utilization of liquid wastes of chemical and food industries.

22. Intensification of the processing of grain raw materials in the production of ethyl alcohol using enzymes.

23. Experimental determination of the parameters of technological processes necessary for the optimal design of complex waste-free technological systems with reverse cycles of water and other components.

24. Development of test systems for assessing the biological benignness of hydrolysates and fermentolysates.

25. Development of laboratory regulations for the production of biotechnological products using dense crops and intensive modes.

26. Biotechnological method for the production of methionine.

27. Innovative technologies in biotechnological production

28. Methods of mathematical modeling of biotechnological processes

29. Specialized equipment for biotechnological production

30. Integrated process control systems

31. Methods of technical and economic analysis of biotechnological production systems

32. Methods for optimizing biotechnological production

33. The main methods of biotechnological processes as objects of management.

34. The principles of automatic control of technological parameters.

35. The structure of technical means of control systems.

36. Technological processes of control objects

37. Principles of automatic control of technological parameters;

38. The structure of technical means of control systems;

39. The main types of automatic control systems.

Приложение 2

МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
Федеральное государственное автономное образовательное учреждение высшего образования
«Дальневосточный федеральный университет»
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ШКОЛА БИОМЕДИЦИНЫ

ФОНД ОЦЕНОЧНЫХ СРЕДСТВ

по дисциплине Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Направление подготовки - 19.04.01 магистерская программа «Agri-Food Biotechnology»

Форма подготовки очная

Владивосток
2021

FOS passport

in the discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Code and wording of competency	Competency Stages	
PK-9 willingness to use the basic principles of organization of metrological support of production	Knows	basic principles of organizing metrological support for the production of agricultural raw materials and food products
	Is able	To use the basic principles of organizing metrological support for the production of agricultural raw materials and food products
	Owns	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products
PK-10 Ability to develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	Knows	principles for developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
	Is able	develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
	Owns	the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards
PK-16 the ability to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control	Knows	operation of control, automation and automated production control, chemical-technical, biochemical and microbiological controls
	Is able	to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control
	Owns	knowledge of the operation of controls, automation and automated production management, chemical-technical, biochemical and microbiological control
PK-17 willingness to conduct pilot development of technology and process scaling	Knows	rules for pilot development of technology and process scaling
	Is able	Pilot technology development and process scaling
	Owns	Knowledge in pilot development of technology and process scaling
PK-19 ability to analyze technological process indicators for compliance with initial	Knows	process indicators for compliance with initial scientific developments
	Is able	analyze the performance of the technological process for compliance with the original scientific developments

scientific developments	Owns	ability to analyze technological process indicators for compliance with initial scientific developments

№	Supervised sections / topics of discipline	Codes and stages of formation of competencies		Evaluation Tools	
				current control	intermediate certification
1	Section 1. Computer modeling of biotechnological processes and systems	PK-9; PK-10; PK-16; PK-17; PK-19	Knows: the basic principles of the organization of metrological support for the production of agricultural raw materials and food products	UO-1 - interview, UO-2 – colloquium	Exam
			Able: to use the basic principles of organization of metrological support for the production of agricultural raw materials and food products		
			Owns: skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products		
2	Section 2. Examples of computer modeling of the simplest typical biotechnological processes and systems	PK-9; PK-10; PK-16; PK-17; PK-19	Knows: the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	UO-1 - interview, UO-2 - colloquium, PR-4 – essay	exam
			Able: to develop		

			a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards		
			Owns: the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards		

Scale for assessing the level of competency formation in the discipline
Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства

Code and wording of competency	**Competency Stages**		**Criteria**	**Indicators**	**Points**
PK-9 willingness to use the basic principles of organization of metrological support of production	knows (threshold level)	basic principles of organizing metrological support for the production of agricultural raw materials and food products	Knowledge of the main directions of development of the raw material base for food biotechnology	The ability to characterize the main directions of development of the raw material base for food biotechnology	45-64
	able (advanced)	use the basic principles of organizing metrological support for the production of agricultural	Ability to navigate the development of the raw material base for food biotechnology	Ability to work with statistical reports, charts, presentations	65-84

		raw materials and food products			
	owns (high)	skills in using the basic principles of organizing metrological support for the production of agricultural raw materials and food products	Tools, methods and techniques for developing the main directions of development of the raw material base for food biotechnology	The ability to fluently and accurately apply the terminological apparatus of the subject area of research in oral answers to questions and in written works, the ability to conduct independent research and present their results for discussion at round tables, seminars, scientific conferences.	85-100
PK-10 Ability to develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	knows (threshold level)	principles for developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	Knowledge of the main criteria for assessing the storage conditions of raw materials to ensure the safety of finished products	The ability to reveal the essence of the storage process of raw materials and products	45-64
	able (advanced)	develop a quality management system for biotechnological products in accordance with the requirements of Russian and international quality	The ability to assess the storage conditions of raw materials to ensure the safety of finished products	Ability to justify and apply the results obtained at product manufacturing enterprises	65-84

		standards			
	owns (high)	the principles of developing a quality management system for biotechnological products in accordance with the requirements of Russian and international quality standards	Possession of principles and methods for assessing the storage conditions of raw materials to ensure the safety of finished products	The ability to formulate a task; the ability to independently adjust the parameters of the storage process of raw materials and products and present the results for discussion at round tables, seminars, scientific conferences	85-100
PK-16 the ability to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control	knows (threshold level)	operation of control, automation and automated production control, chemical-technical, biochemical and microbiological controls	Knowledge of the main ways of monitoring compliance with environmental and biological safety of raw materials and finished products	The ability to reveal the essence of the technological process of production of products in terms of monitoring compliance with environmental and biological safety of raw materials and finished products	45-64
	able (advanced)	to carry out the effective work of controls, automation and automated production management, chemical-technical, biochemical and microbiological control	The ability to work with tables and reference materials, the ability to apply methods of processing current production information, to analyze the data obtained for use in monitoring compliance with environmental and biological safety of raw materials and finished products	Ability to justify and apply the results obtained at product manufacturing enterprises	65-84
	owns	knowledge	Possession of	The ability to	85-

	(high)	of the operation of controls, automation and automated production management, chemical-technical, biochemical and microbiological control	principles and methods of monitoring compliance with environmental and biological safety of raw materials and finished products	formulate a task; the ability to independently process current production information, analyze the data obtained for use in monitoring compliance with the environmental and biological safety of raw materials and finished products and present the results for discussion at round tables, seminars, scientific conferences	100
PK-17 willingness to conduct pilot development of technology and process scaling	knows (threshold level)	rules for pilot development of technology and process scaling	Knowledge of the main ways of monitoring compliance with environmental and biological safety of raw materials and finished products	The ability to reveal the essence of the technological process of production of products in terms of monitoring compliance with environmental and biological safety of raw materials and finished products	45-64
	able (advanced)	Pilot technology development and process scaling	The ability to work with tables and reference materials, the ability to apply methods of processing current production information, to analyze the data obtained for use in monitoring compliance with environmental and biological safety of raw	Ability to justify and apply the results obtained at product manufacturing enterprises	65-84

			materials and finished products		
	owns (high)	Knowledge in pilot development of technology and process scaling	Possession of principles and methods of monitoring compliance with environmental and biological safety of raw materials and finished products	The ability to formulate a task; the ability to independently process current production information, analyze the data obtained for use in monitoring compliance with the environmental and biological safety of raw materials and finished products and present the results for discussion at round tables, seminars, scientific conferences	85-100
PK-19 ability to analyze technological process indicators for compliance with initial scientific developments	knows (threshold level)	process indicators for compliance with initial scientific developments	Knowledge of the main ways of monitoring compliance with environmental and biological safety of raw materials and finished products	The ability to reveal the essence of the technological process of production of products in terms of monitoring compliance with environmental and biological safety of raw materials and finished products	45-64
	able (advanced)	analyze the performance of the technological process for compliance with the original scientific developments	The ability to work with tables and reference materials, the ability to apply methods of processing current production information, to analyze the data obtained for use in monitoring	Ability to justify and apply the results obtained at product manufacturing enterprises	65-84

			compliance with environmental and biological safety of raw materials and finished products		
	owns (high)	ability to analyze technological process indicators for compliance with initial scientific developments	Possession of principles and methods of monitoring compliance with environmental and biological safety of raw materials and finished products	The ability to formulate a task; the ability to independently process current production information, analyze the data obtained for use in monitoring compliance with the environmental and biological safety of raw materials and finished products and present the results for discussion at round tables, seminars, scientific conferences	85-100

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 Examination Criteria

Points required to evaluate the final test	Credit score	Requirements for completed competencies in the student's oral response
85-100	Excellent	Excellent rating is given to a student who has strong knowledge of the raw material base for the production of functional foods. Able to successfully conduct research to identify sources for the production of functional foods. He knows the methods of processing current production information, performing analysis of the obtained data for use in product quality management
75-85	Good	Grade "good" is given to a student who knows a significant part of the program material, does not make significant mistakes, but hesitantly performs practical work
61-75	Satisfactorily	Grade "satisfactorily" is given to a student who knows a significant part of the program material, but makes significant mistakes, uncertainly with great difficulties performs practical work
60-0	Unsatisfactory	Grade "unsatisfactory" is given to a student who does not know a significant part of the program material, makes significant mistakes, hesitates with practical difficulties with practical difficulties and cannot continue training without additional classes in the relevant discipline.

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 Examination Criteria

Points required to evaluate the final test	Credit score	Requirements for completed competencies in the student's oral response
100-61	«Credited»	The student is credited if he has knowledge on the physiological basis of the organization of balanced rational nutrition of various

		population groups. Able to successfully conduct research on the digestibility and digestibility of food substances by a person, as well as to calculate the energy value of food, human consumption of useful substances. He owns methods for determining the biological and energy value of food, digestibility and digestibility of food substances, taking into account the characteristics of the human body.
60-0	«Not credited»	The student is not credited if he does not know a significant part of the program material, makes significant mistakes, hesitates with practical difficulties with practical difficulties and cannot continue training without additional classes in the relevant discipline.

Questions for the exam

in the discipline Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства:

1. Substances that increase the shelf life of products.

2. Biological objects and raw material base

3. Cultivation of microorganisms and obtaining final products

4. Cultivation of microorganisms and obtaining final products

5. Microbiological safety of the hospital.

6. The Russian system of quality control of food production, including the use of water fishing facilities.

7. Characterization of international quality standards for aquatic habitats.

8. The principles of the HACCP system.

9. International standards of food and agricultural organization CAC / PCP.

10. Standard methods for determining microbiological parameters in food

11. Give a diagram of the biotechnological process of bread production

12. Biotechnological method for the production of citric acid.

13. Biotechnological method of deep fermentation using mold Aspergillus niger.

The most important product of the microbiological industry is food grade acetic acid.

Biotechnological method for the production of lactic acid.

14. Biotechnological method for the production of paprine.

15. Biotechnological method for the synthesis of amino acids.

16. Biotechnological method for the production of feed lysine

17. Development of adaptive control algorithms for the process of cultivation of alcohol producers.

18. Contours and control algorithms of fermentation processes.

19. Optimization of culture media and modes of cultivation of microorganisms using situational management algorithms.

20. The study of oxygen mass transfer in the processes of microbiological synthesis.

21. The study of the process of obtaining nutrient media for biotechnological production based on acid hydrolysates of plant wastes.

22. Development of methods for the operative diagnosis of microbiological processes.

23. Development of an installation for measuring the benignity of plant waste hydrolysates as secondary material resources.

24. Intensification of the processes of utilization of liquid wastes of chemical and food industries.

25. Intensification of processing of grain raw materials in the production of ethyl alcohol using enzymes.

26. Experimental determination of the parameters of technological processes necessary for the optimal design of complex waste-free technological systems with reverse cycles of water and other components.

27. Development of test systems for assessing the biological benignness of hydrolysates and fermentolysates.

28. Development of laboratory regulations for the production of biotechnological products using dense crops and intensive regimes.

29. Biotechnological method for the production of methionine.

30. Innovative technologies in biotechnological production

31. Methods of mathematical modeling of biotechnological processes

32. Specialized equipment for biotechnological production

33. The concept of integrated process control systems

34. Methods of technical and economic analysis of biotechnological production systems

35. Methods for optimizing biotechnological production

36. The main methods of biotechnological processes as objects of management.

37. Principles of automatic control of technological parameters.

38. The structure of technical means of control systems.

39. Technological processes of control objects

40. Principles of automatic control of technological parameters;

41. The structure of technical means of control systems;

42. The main types of automatic control systems.

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, 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 on the subject

Biotechnological hardware and software / Аппаратурно-программные средства биотехнологического производства:

1. What is the main task of the identification examination of functional products?

2. For what purpose is the examination of the authenticity of functional products?

3. What does the term “conformity” mean for a particular product?

4. List the types of conformity assessment activities

product quality.

5. What is “functional food”?

6. What document are the results of the quality examination?

7. In which document does the expert reflect the results of identification products?

8. What indicators are confirmed with mandatory certification?

9. What is the purpose of consumer identification?

10. What indicators of a functional product are suitable for identification?

11. What is falsification of a functional product?

12. What are organoleptic studies?

13. What is assortment falsification of a functional product?

14. What are the main ingredients that provide food functionality?

15. What is information falsification of a functional product?

16. What organoleptic characteristics are used to identify functional

products?

17. What physico-chemical quality indicators are used to identify functional products?

18. How is the evaluation of research results to identify functional products?

19. The requirements of which regulatory document must meet product information?

20. Requirements for functional foods

21. The range of functional food products

22. The main provisions of the concept of healthy and safe nutrition of the population of Russia.

23. What is the time frame for identifying functional products?

24. Classification of functional products

VARIANTS OF THE EXAMINATION FOR INTERMEDIATE CERTIFICATION

VARIANT 1

1. Define the acid number of the oil.

2. Give the chemical reactions underlying the determination of nitrites in sausages.

3. Give the chemical reactions underlying the method for the determination of sugars by the iodine method.

4. What is the essence of the method and why is titratable acidity of dairy products determined.

5. Assess the freshness of sea fish, if the number of LO 48, and TMA 4

6. How to determine the completeness of pasteurization of milk?

7. Give the chemical reactions that underlie the definition of salt by the Mohr method.

8. To determine table salt by the method of Folhard, 2.2 g of product was taken. 25ml 0.1n was added to the sample. silver nitrate. After the addition of reagents and indicator, an excess of silver nitrate was titrated to 13.5 ml 0.1011N.

potassium thiocyanate. 24.5 ml of potassium thiocyanate were spent on a blank experiment. Calculate the% content of sodium chloride.

9. For the study of poultry meat took 0.6530 g of fat. After the addition of reagents and an indicator for titration, 0.95 ml of 0.002 N were consumed. sodium thiosulfate. Calculate the peroxide value (in% iodine) and evaluate the freshness of the bird.

10. Make a conclusion about the freshness of freshwater fish on the basis of the following data when determining volatile bases: the weight of the sample is 7.8 g, 25 ml of 0.0980 n are poured into the receiver flask. sulfuric acid. The titration of excess sulfuric acid went to 21.5 ml 0.1055n. caustic soda solution.

VARIANT 2

1. Define the peroxide value of the oil.

2. Give the chemical reactions underlying the method for determining the freshness of fish by the number of volatile bases and trimethylamine.

3. Give the chemical reactions that underlie the method for determining starch in sausages.

4. What is the essence of the method and why is the acid number of poultry fat determined.

5. Assess the freshness of milk if its titratable acidity is 20 degrees Turner.

6. How to determine the completeness of milk sterilization.

7. Give chemical reactions for the determination of table salt by the method of Folhard.

8. When determining the acidity of milk, 20 ml of the product were taken for analysis (pl. 1,030). 4.5 ml of 0.1021n were used for titration. caustic potassium. Calculate titratable acidity and conclude that milk is fresh.

9. For the study of poultry meat took 3.0550 g of fat. Calculate the acid number if the titration went to 0.9 ml 0.1068n. potassium hydroxide solution. Make a conclusion about the freshness of the bird.

10. Make a conclusion about the freshness of freshwater fish on the basis of the following data when determining volatile bases: the weight of the sample is 7.8 g, 25 ml of 0.0980 n are poured into the receiver flask. sulfuric acid. The titration of excess sulfuric acid went to 21.5 ml 0.1055n. caustic soda solution.

TESTS

1. Define nutritional supplements (NS):

1. Food-grade harmless substances added to food.

2. Natural or artificial substances specially introduced into products to give them the desired properties.

3. Substances of natural origin for introduction into products with the aim of the necessary change in their properties.

2. List the main functions of food additives:

1. Dyes, thickeners, flavorings, preservatives, antioxidants.

2. Improving the appearance, regulating the consistency, taste and smell, maintaining the quality of the product.

3. Tinting, texture formation, flavoring, increasing shelf life of products.

3. What attributes should the NS to which the index "E" be assigned?

1. Safety in technological application and purity of chemical composition.

2. Safety to the extent necessary for the technology and chemical purity.

3. Safety and cleanliness for prolonged use, technological necessity of use.

4. In what cases is the introduction of NS in food products not allowed?

1. When the dosage of NS meets safety margins.

2. If NS is used to hide defects in the product.

3. When the introduction of NS will reduce the energy value of the product.

5. What types of dyes are used in food technology?

1. Natural, organic, mineral.

2. Natural, synthetic, mineral.

3. Vegetable, artificial, inorganic.

6. **What are the main types of thickeners and gelling agents:**

1. NS polysaccharide nature: land and sea.

2. NS polysaccharide nature and their modifications.

3. NS polysaccharide nature and gelatin.

7. The mechanism of gel formation by polysaccharides:

1. The binding of water and the folding of the polymer chains of polysaccharides.

2. Due to the natural volumetric spiral structure or sugar-acid formation of the gel framework.

3. Due to the loss of water mobility in the microcells of the gel structure in the presence of calcium ions.

8. What is called hydrophilic-lipophilic balance?

1. The ratio of lipophilic and hydrophobic regions of the emulsifier molecule.

2. The efficiency of the emulsifier.

3. The ratio of the polar and nonpolar parts of the emulsifier molecule.

9. What are the most important enhancers of taste and smell of products:

1. Nutrients with the “glutamine satisfaction effect”.

2. Glutamic, guanilic, inosinic acids and their salts.

3. Ribonucleotides, glutamates and inositol of potassium.

10. What preservatives are natural and found in food?

1. Sorbic acid and its salts.

2. Urotropin.

3. Benzoic acid and its salts.

11. What is the principle of action of antioxidants?

1. The binding of metal ions of variable valency.

2. Neutralization of free and peroxide radicals.

3. The increase in the duration of the induction period.

12. What are the differences between probiotics and prebiotics?

1. Probiotics - dietary supplements of microbial origin, and prebiotics - dietary supplements of mixed composition.

2. Probiotics - representatives of the normal intestinal microflora; prebiotics are probiotic generators.

3. Probiotics - pure cultures of intestinal microorganisms, prebiotics - stimulants of probiotics.

TESTS FOR SELF-TESTING AND SELF-PREPARATION

The purpose of creating the PTM is to check the residual knowledge.

The source documents used in the development of the PTM - discipline program "Identification of functional foods"

The number of testing options is 3.

The number of questions in one embodiment is 12.

The choice of answer (the number of correct tests) is 1 or more than 1.

It is recommended to count only the question (test) in which all the correct answers are given.

Grade Scale:

rating “2” - less than 50% of the total number of correct answers is indicated

rating “3” - from 50% to 74%

rating “4” - from 75% to 89%

rating “5” - over 89%

TEST № 1

The test contains 12 tasks, which take 30 minutes to complete. Choose the most correct, in your opinion, answer option and mark it with any icon in the answer form.

1. Pectin substances belong to

1) proteins *2) carbohydrates*

3) fats *4) minerals*

2. The main source of carbohydrates are foods

1) dairy *2) meat*

3) vegetable *4) fish*

3. Melanoidinogenesis is a transformation in technological processes

1) carbohydrates 2) minerals

3) fat 4) protein

4. Food additives do not apply

1) sweeteners 2) vitamins

3) colorants 4) flavorings

5. When determining the protein for decomposition of the sample using

1) sulfuric acid 2) hydrochloric acid

3) nitric acid 4) hydrofluoric acid

6. The yellow pigment of apples and tomatoes is called

1) mycopene 2) xanthophyll

3) zeaxanthin 4) betanin

7. Cyclomats belong to the following group of food additives

1) sweeteners 2) flavorings

3) preservatives 4) dyes

8. The permissible daily dose of nitrates for an adult is

1) 125mg 2) 225mg

3) 325mg 4) 425mg

9. Nitrosamines are not contained in

1) smoked meats 2) cereals

3) cheeses 4) beer

10. When determining salt in foods, sample preparation is carried out

1) preliminary drying of the sample 2) preliminary ashing of the sample

3) by preparing an aqueous extract of dyes; 4) by preliminary precipitation of proteins

11. The determination of ash insoluble in 10% hydrochloric acid is not carried out in the analysis of quality

1) milk 2) flour

3) caviar 4) roasted coffee

12. When determining fats by the Soxhlet method, together with fats, an organic solvent is not extracted

1) phospholipids *2) water*

3) fat-soluble vitamins *4) sterols*

Answer Form

№	1	2	3	4	5	6
1)						
2)						
3)						
4)						
№	7	8	9	10	11	12
1)						
2)						
3)						
4)						

Evaluation criterion. For the correct solution to any task of the test, the student receives 2 points. The test is considered passed when a student enters a minimum of 20 points.

Criteria for evaluating independent work

Evaluation criterion	Maximum points
1. Knowledge of the basic components of food composition	5
2. The ability, depending on the type of product, to select a sampling and sample preparation sample	4
3. Knowledge of laboratory methods for the analysis of food quality	5
4. Knowledge of the classification, structure and application of food additives	5

5. Knowledge of natural toxicants and pollutants	4
Total	23 points

TEST № 2

The test contains 12 tasks, which take 30 minutes to complete. Choose the most correct, in your opinion, answer option and mark it with any icon in the answer form.

1. The moisture content of the grain that is stored must not exceed

1) 13% *2) 15%*

3) 17% *4) 19%*

2. In the study of grain in the laboratory, "kind" means mass

1) 0.5l of grain *2) 2l of grain*

3) 1l of grain *4) 3l of grain*

3. The content of metal impurities in the grain should not exceed

1) 3mg / kg *2) 7mg / kg*

3) 5mg / kg *4) 9mg / kg*

4. The humidity of pasta should not exceed

1) 9% *2) 13%*

3) 11% *4) 15%*

5. Glassy grain characterizes the structure

1) aleurone layer *2) shells*

3) endosperm *4) fetus*

6. Grain infected with barn pests has a honey smell and then a smell

1) ammonia *2) hydrogen sulfide*

3) malt *4) hay*

7. The oil content of sunflower meal obtained in forpresses is

1) 5-10% *2) 10-15%*

3) 15-18% *4) 20-25%*

8. The extraction of oil from the prepared cake of sunflower seeds is carried out using most often

1) extraction gasoline *2) benzene*

3) hexane *4) carbon tetrachloride C*

9. The first step in refining vegetable oils is

1) freezing waxes *2) alkaline neutralization*

3) hydration *4) whitening*

10. To remove wax from vegetable oil, it is cooled to a temperature

1) 5-7 ° C *2) 10-12 ° C*

3) 12-14 ° C *4) 14-16 ° C*

11. Weed and grain impurities of grain should not exceed

1) 3% *2) 4%*

3) 5% *4) 6%*

12. The moisture content of flour should not exceed

1) 10% *2) 12%*

3) 15% *4) 17%*

Answer Form

№	1	2	3	4	5	6
1)						
2)						
3)						
4)						
№	7	8	9	10	11	12
1)						
2)						
3)						
4)						

Evaluation criterion. For the correct solution to any task of the test, the student receives 2 points. The test is considered passed when a student enters a minimum of 20 points.

Criteria for evaluating independent work

Evaluation criterion	Maximum points
1. Knowledge of the structure, chemical composition and properties of grain	5
2. The ability to classify the properties and quality indicators of grain mass and grain of the main culture	4
3. Knowledge of grain processing technology and quality indicators of grain products	5
4. The ability to describe the production technology, refining and processing of vegetable oil in stages with the introduction of chemical reactions	5
5. Knowledge of the main standardized indicators of the quality of vegetable oils	3
Total	22 points

TEST №3

The test contains 12 tasks, which take 30 minutes to complete. Choose the most correct, in your opinion, answer option and mark it with any icon in the answer form.

1. Pasteurized milk is considered fresh if titratable acidity does not exceed

1) 21oT *2) 22oT*

3) 23oT *4) 24oT*

2. The volume of the combined sample of dairy products for analysis is

1) 250ml *2) 500ml*

3) 1000ml *4) 1500ml*

3. Prior to the analysis, the sample can be stored in the laboratory no more

1) 1 hours *2) 2 hours*

3) 3 hours *4) 4 hours*

4. The fat content in natural milk usually does not exceed

1) 2% *2) 4%*

3) 6% *4) 8%*

5. Casein proteins of milk precipitate at pH

1) 4.4 *2) 4.5*

3) 4.6 *4) 4.7*

6. The completeness of pasteurization of dairy products is determined by the activity of the enzyme

1) phosphatase *2) hydrolase*

3) peroxidase *4) dihydrogenase*

7. The maximum permissible concentration of nitrites in sausages is

1) 30mg / kg *2) 40mg / kg*

3) 50mg / kg *4) 60mg / kg*

8 The ratio of saturated, mono- and polyunsaturated fatty acids in pork adipose tissue is

1) 3: 3: 1 *2) 3: 4: 1*

3) 3: 5: 1 *4) 3: 6: 1*

9. The content of sodium chloride salt in cooked sausages usually does not exceed

1) 1.5% *2) 2.5%*

3) 3.5% *4) 4.5%*

10. The presence of ammonia and ammonium salts is determined by assessing the quality and freshness

1) sausages *2) meat*

3) poultry meat *4) canned meat*

11 .. The maximum permissible histamine content in fish is

1) 5mg% *2) 10mg%*

3) 15mg% *4) 20mg%*

12. The determination of nitrogen of volatile bases, including trimethylamine, is carried out when assessing the quality

1) salted fish *2) canned fish*

3) stockfish *4) frozen fish*

Answer Form

№	1	2	3	4	5	6
1)						
2)						
3)						
4)						
№	7	8	9	10	11	12
1)						
2)						
3)						
4)						

Evaluation criterion. For the correct solution to any task of the test, the student receives 2 points. The test is considered passed when a student enters a minimum of 20 points.

Criteria for evaluating independent work

Evaluation criterion	Maximum points
1. Knowledge of the chemical composition, processing technology and basic standardized indicators of milk and dairy products	5
2. Knowledge of the chemical composition, processing technology and basic standardized indicators of meat and meat products	5
3. Knowledge of the chemical composition and basic standardized indicators of poultry meat	4
4. Ability to describe the chemical composition of fish and the processes that occur during its storage	5
5. Knowledge of the technology for obtaining fish products and the main standardized quality indicators of chilled, frozen, salted fish and canned fish	5
Total	24 points