



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

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**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**

Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых  
продуктов

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

**Форма подготовки очная**

Школа биомедицины

Департамент пищевых наук и технологий

Курс 2 семестр 3

Лекции 9 час.

Практические занятия 27 час.

Лабораторные работы     -     час

Самостоятельная работа 18 час.

Всего часов 72 час

Всего часов аудиторной нагрузки 36 час

Курсовая работа 3 семестр

Зачет - не предусмотрен учебным планом

Экзамен 3 семестр

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

УМКД обсужден на заседании Департамента пищевых наук и технологий Школы биомедицины ДФУ протокол № 1 от «11» июля 2018 г.

Директор Департамента пищевых наук и технологий Ю.В. Приходько

Составитель: Ким Е.М.

ANNOTATION  
of the educational complex of discipline  
Safety of agri-food raw materials and food / Безопасность  
агропродовольственного сырья и пищевых продуктов  
Direction of preparation: 19.04.01 Biotechnology  
Educational program: "Agri-Food Biotechnology"

Direction of preparation 19.04.01 "Biotechnology"

Educational program: "Agri-Food Biotechnology"

The educational-methodical complex of the discipline "Safety and biosafety of agri-food raw materials and food products" was developed for 2nd year students in the direction 19.04.01 "Biotechnology", the master's program "Agri-Food Biotechnology" in accordance with the requirements of OS HE in this area.

The discipline "Safety and biosafety of agri-food raw materials and food products" is included in the variable part (compulsory disciplines) of the professional cycle.

The total complexity of mastering the discipline is 108 hours. The curriculum includes lecture classes (9 hours), practical classes (27 hours), independent work of the student (18 hours), controlled independent work (54 hours). The discipline is implemented on the 2 course in the 3 semester.

The content of the discipline covers the following range of issues: classification of foreign substances; ways of entering into food products of toxic elements: dioxins and polycyclic aromatic hydrocarbons; pesticides, nitrates and nitrites; plant growth regulators entering food from plant materials; natural toxicants: bacterial toxins, mycotoxins; radioactive contamination of food; safety requirements for food products by microbiological indicators; anti-nutritional nutritional factors.

The discipline Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых продуктов is logically and meaningfully connected with such courses as microbiology, organic chemistry, sanitation and food hygiene.

The discipline is aimed at the formation of cultural and professional competencies.

Educational complex includes:

- 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  
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Федеральное государственное автономное образовательное учреждение  
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**ШКОЛА БИОМЕДИЦИНЫ**

«СОГЛАСОВАНО»

Руководитель ОП

Каленик Т.К.

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«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 (РПУД)**

Safety and biosafety of agri-food raw materials and food products

**Направление подготовки 19.04.01 Биотехнология**

Agri-Food Biotechnology

**Форма подготовки очная**

Курс 2 семестр 3

Лекции 9 час.

Практические занятия 27 час.

Лабораторные работы     -     час

Самостоятельная работа 18 час.

Всего часов 72 час

Всего часов аудиторной нагрузки 36 час

Курсовая работа 3 семестр

Зачет - не предусмотрен учебным планом

Экзамен 3 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

Составитель (ли): Ким Е.М.

**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)

## ABSTRACT

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

**Study profile/ Specialization/ Master's Program "Title"**

« Agri-Food Biotechnology»

**Course title:** Safety and biosafety of agri-food raw materials and food products

**Variable part of Block, B1.V.OD.2.1 \_3\_credits**

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

- ability to take initiative and make responsible decisions, aware of the responsibility for the results of their professional activities;
- the ability to creatively perceive and use the achievements of science and technology in the professional sphere in accordance with the needs of the regional and global labor market;
- ability to use modern methods and technologies (including information) in professional activities.

**Learning outcomes:**

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

PC-12 with the ability to plan and carry out activities to ensure safety in the workplace, to monitor and protect the environment

PC-16 with the ability to perform effective work of the means of control, automation and automated production management, chemical-technical, biochemical and microbiological control

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

PC-20 ability to ensure the biological safety of raw materials, semi-finished products, finished products

**Course description:** study of safety indicators of food raw materials and food products, in accordance with the regulatory documentation of the Russian Federation and the Customs Union (CU): microbiological standards; pathogenic regulations; hygiene requirements; permissible levels of radionuclides; requirements for unprocessed raw materials of animal origin; parasitological indicators of fish and crustacean safety. The study of biological hazards for food systems involves the study of microorganisms and their toxins, helminths, pests of grain stocks (insects, mites). The study of microbiological and pathogenic standards involves the study of the microflora of raw materials and products of animal and vegetable origin; pathogens, mechanisms of their microbial spoilage, epidemic significance in the occurrence of various human infectious diseases, methods and measures of prevention.

**Main course literature:**

1. Poznyakovsky V.M. Hygienic bases of nutrition, quality and food safety [Electronic resource]: textbook / Poznyakovsky VM - Electron. text data.— Saratov: University education, 2014.— 453 c.— Access mode: <http://www.iprbookshop.ru/4175.html>.

2. Safety of food raw materials and food products [Electronic resource]: a tutorial / I.A. Horns [et al.] .— Electron. text data.— Saratov: University education, 2014.— 226 c.— Access mode: <http://www.iprbookshop.ru/4176.html>.

3. Safety of food raw materials and food [Electronic resource]: a tutorial / A.D. Dimitriev [et al.] . - Electron. Dan. - Kazan: KNRTU, 2016. - 188 p. - Access mode: <https://e.lanbook.com/book/102022>.

4. Expertise of specialized foods. Quality and safety [Electronic resource]: study guide / L.A. Mayurnikova [et al.] . - Electron. Dan. - St. Petersburg: GIORD, 2016. - 448 p. - Access mode: <https://e.lanbook.com/book/69878>.

5. Lakiza N.V. Analysis of food products [Electronic resource]: study guide / Lakiza N.V., Neudachina L.K. — Electron. text data.— Ekaterinburg: Ural Federal University, DIA, 2015. — 188 p.— Access mode: <http://www.iprbookshop.ru/69578.html>.

**Form of final knowledge control:** offset



**Annotation to the work program of the discipline**  
Safety of agri-food raw materials and food / Безопасность  
агропродовольственного сырья и пищевых продуктов

The discipline “Safety and biosafety of agri-food raw materials and food products” is included in block B1.V.OD.2.1 and refers to its variable part of the master's program on April 19, 01 - “Biotechnology”.

The total complexity of mastering the discipline is 3 credits, (108 hours). The curriculum includes lecture classes (9 hours), practical classes (27 hours), independent work of students (18 hours), Controlled independent work (54 hours). The discipline is implemented in the 2nd year in the 3rd semester. Assessment of learning outcomes: exam in 3 semesters.

The discipline Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых продуктов is logically and meaningfully connected with such courses, microbiology, organic chemistry, sanitation and food hygiene.

In turn, it is the "foundation" for the study of disciplines: "Quality and Safety Management Systems for Bioproducts", "Biotechnology of Genetically Modified Raw Materials and Foodstuffs", "Design and Organization of Agri-Food Biotechnology Production", "Food Legislation and Food Security", "Specialized Production Biotechnology food products. "

The content of the discipline covers the following range of issues: the study of safety indicators for food raw materials and food products, in accordance with the regulatory documents of the Russian Federation and the Customs Union (CU): microbiological standards; pathogenic standards; hygiene requirements; permissible levels of radionuclides; requirements for unprocessed raw materials of animal origin; parasitological safety indicators for fish and crustaceans. The study of biohazard factors for food systems involves the study of microorganisms and their toxins, helminths, pests of grain stocks (insects, mites). The study of microbiological and pathogenic standards provides for the study of the microflora

of raw materials and products of animal and vegetable origin; pathogens, mechanisms of their microbial spoilage, epidemic significance in the occurrence of various human infectious diseases, methods and measures of prevention.

**The purpose** - "Safety and biosafety of agri-food raw materials and food products" is the training of qualified specialists with in-depth knowledge in theoretical aspects of the safety and biosafety problems of food products and knowledge of methodological techniques in its practical application.

**The objectives** of the discipline "Safety and biosafety of agricultural raw materials and food products":

- study of the regulatory framework to ensure and control the quality and safety of food raw materials and food products, environmental aspects of nutrition;
- the development of methods of hygienic control of microbiological indicators and safety indicators; study of sources and ways of contamination of food raw materials and food products;
- mastery of the system of quality control and food safety at the stages of production, transportation, storage and marketing in accordance with applicable law;
- the study of concepts for ensuring food safety and nutrition.

For successful study of the discipline Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых продуктов the following preliminary competencies should be formed in students:

- the ability to take initiative and make responsible decisions, realizing responsibility for the results of their professional activities;
- the ability to creatively perceive and use the achievements of science and technology in the professional sphere in accordance with the needs of the regional and world labor market;
- the ability to use modern methods and technologies (including information) in professional activities.

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

Code and wording of competency	Competency Stages	
PC-11 the ability to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	knows	the procedure for ensuring technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	Able to	provide technological discipline, sanitary and hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	owns	skills to ensure technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition
PC-12 the ability to plan and carry out activities to ensure industrial safety, environmental monitoring and protection	knows	<ul style="list-style-type: none"> <li>- regulatory legal documents in their activities;</li> <li>- requirements for industrial safety</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>- classify legal documents in their professional activities;</li> <li>- use legal documents in their activities;</li> <li>- plan measures to ensure industrial safety, environmental monitoring and protection</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- acquired knowledge in professional activities;</li> <li>- an independent analysis of scientific literature;</li> <li>- the ability to carry out activities to ensure safety at work, to monitor and protect the environment</li> </ul>
PC-16 ability to carry out effective work of control, automation and automated production control, chemical-technical, biochemical and microbiological control	knows	<ul style="list-style-type: none"> <li>- The principle of control, automation and automated production management, chemical-technical, biochemical and microbiological</li> <li>- sanitary and hygienic requirements in the work of enterprises;</li> <li>- the procedure for organizing biotechnological processes and industries;</li> <li>- features of the technological process based on technological regulations; the scientific basis for increasing efficiency.</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>use modern methods of physico-chemical, biochemical and microbiological control and quality analysis based on standard and certification tests;</li> <li>ensure the maintenance of technological equipment in proper technical condition;</li> <li>plan the work of biotechnological processes and industries;</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- Department of production and chemical-technical, biochemical and microbiological control</li> <li>- provide technological discipline;</li> <li>- management skills of existing biotechnological processes and industries;</li> <li>- methods to ensure the stability of production indicators.</li> </ul>
PC-18 the ability to develop and scientifically substantiate schemes for the optimal integrated	knows	<ul style="list-style-type: none"> <li>- requirements of the standards of the quality management system of biotechnological production;</li> <li>- methodological documents for product quality management;</li> <li>- requirements for the organization of work with personnel.</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>- carry out the process in accordance with the regulations;</li> </ul>

certification of biotechnological products		<ul style="list-style-type: none"> <li>- use instrumentation in the production of biotechnological products;</li> <li>- use the basic principles of organization of metrological support of production;</li> <li>- plan and carry out activities to ensure industrial safety.</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- methods in the field of quality management system of biotechnological production;</li> <li>- skills of operational control at all stages of the production process for compliance with quality standards and technical conditions.</li> </ul>
PC-20 the ability to ensure the biological safety of raw materials, semi-finished products, finished products	knows	<ul style="list-style-type: none"> <li>- requirements for environmental and biological safety of raw materials and finished products;</li> <li>regulatory and methodological documents</li> <li>- regulatory issues of product quality; –</li> <li>-normative and methodological documents regulating the requirements for materials, semi-finished products, purchased products and finished products</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>-to assess the conformity of raw materials and finished products to environmental and biological safety requirements;</li> <li>-determine the need to develop new methods and means of measurement;</li> <li>-exploit basic technological and laboratory equipment</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- the skills of organizing work on the development of new methods and means of technical control of biological safety;</li> <li>-methodology for assessing compliance with environmental and biological safety requirements;</li> <li>- Skills in the analysis of the state of technical control of product quality in production</li> </ul>

To form the above competencies within the framework of the discipline Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых продуктов the following methods of active / interactive training are used:

### **Discussion lecture**

Preparation of the discussion determines the form of its holding. You can use a variety of options. The topic is determined and announced in advance, it is given time to “vilify it in oneself”, to gather thoughts and material. The main options for preparing for the discussion and, accordingly, the form of its holding:

Participants, grouped by views, prepare abstracts in advance and “publish” them, that is, distribute them among future participants in the discussion. The teacher may receive them, like everyone else, or may not receive them (to demonstrate pure neutrality).

1. Preliminary preparation is scattered, individually. Participants logically and actively group in “parties” during the discussion. In this case, the discussion begins with a statement of positions, and only then there is a controversy.

2. Participants are not inclined to actively group and actively declare positions. In this case, it makes sense to divide the group into subgroups and invite them to talk to each other. After a conversation in small groups, each of them reports either a general position or the main positions that have come to light.

In the course of preparation, this option is also possible: the teacher draws up a list of questions for discussion and passes it to students not as mandatory, but as one of the possible approaches.

The teacher is having a discussion. During the discussion, its lead teacher does not teach any position, but the ability to state and argue any position chosen by one or another participant.

### **Seminars - Press Conferences**

For each question of the plan of the seminar, a group of trainees (3-4 people) as experts is appointed by the teacher. They comprehensively study the problem and provide a rapporteur for the presentation of abstracts on it. After the first report, the seminar participants ask questions that are answered by the speaker and other members of the expert group. Questions and answers form the central part of the workshop. Based on questions and answers, a creative discussion unfolds, the results of which are first summed up by the speaker and then the teacher. Other issues of the seminar plan are discussed in a similar manner. In the final word, the teacher summarizes the discussion of the topic, evaluates the work of expert groups, defines the tasks of independent work.

## **I. STRUCTURE AND CONTENT OF THE THEORETICAL PART OF THE COURSE(9 HOURS. MAO 4 HOURS.)**

### **MODULE 1. Hygienic requirements for indicators of quality and safety of food products (5 hours)**

#### **Topic 1. State policy of the Russian Federation in the field of ensuring the quality and safety of food products (1 hour)**

The main provisions of the Federal Law of the Russian Federation "On the quality and safety of food products" from 2.01.2000; Federal Law of the Russian Federation "On the Sanitary and Epidemiological Well-Being of the Population" (Articles 15, 43, 16); Technical Regulations of the Customs Union (TR CU).

Alien, potentially dangerous compounds of anthropogenic or natural origin - contaminants, xenobiotics, foreign chemical substances (CV), definition, classification. The main ways of contamination of food and food raw materials by xenobiotics.

#### **Topic 2. Pollution with substances and compounds used in crop production and animal husbandry. Pollution with nitrates, nitrites and nitroso compounds (2 hours)**

Plant Growth Regulators. Natural and synthetic PPP. Mechanism of action. Prevention of pollution. Fertilizers: nitrogen, phosphorus, potash, micronutrient fertilizers, complex fertilizers, organic. Wastewater and solid waste used for irrigation and fertilizer. Types of wastewater: domestic and fecal, wastewater of livestock complexes, industrial, mixed urban wastewater. The main sources of nitrates and nitrites in food raw materials and food products. The reasons for the increased content of nitrates and nitrites in vegetables. The biological effect of nitrates and nitrites on the human body. Rationing of nitrates, nitrites as food additives. Technological methods for reducing nitrates in food raw materials.

Nitroso compounds and their toxic characteristics. Hygienic regulation. Prevention of pollution.

**Topic 3. Characterization of individual xenobiotics. Food contamination with toxic elements. Hygienic requirements for TR TS (2 hours.)**

Dioxins and polycyclic aromatic and chlorine-containing hydrocarbons. Pesticide pollution. Contamination of food products with toxic metals (lead, cadmium, arsenic, mercury, copper, chromium, tin.) Distribution in nature, industrial use, metal sources, content in food products. Characterization of diseases caused by the toxic effects of metal, prevention of pollution.

The concept of pesticides, classification by toxicity, by cumulative properties, by persistence. Hygienic characteristics of pesticides: OCP, FOP, ROP. Technological methods for reducing residual pesticides in food products.

Radioactive background and problems of its reduction. Possible ways of contamination of food products. Cosmic radiation, natural and artificial radionuclides. Prevention of accumulation of radionuclides in the body. Radiation safety standards SP 2.6.1.758 - 99 (NRB-99). Products with radioprotective action. Normalized radionuclides (cesium, strontium).

**Module 2. Biosafety of food raw materials and food products (4 hours)**

**Topic 1. Safety indicators of raw materials and products of animal origin according to ND RF and TR CU. (2 hours)**

Safety indicators of raw milk, sterilized milk, dairy products. Sourdough, their safety, safety indicators. Safety indicators of meat and meat products, smoked meats, sausages. Safety indicators for poultry and its processed products, eggs and egg products.

**Topic 2. Microbiological standards, pathogenic standards, parasitological indicators of fish and crustacean safety. Food contamination with toxic metals. (2 hours)**

Safety indicators of fish and fish products (fresh fish, salted, smoked, dried, dried; fish semi-finished products and culinary products; preserves, fish caviar and main non-fish seafood).

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

### **Practical lessons**

**(27 HOURS, MAO-12 HOURS)**

#### **Lesson 1. Theoretical foundations of the safety of food raw materials and food products (2 hours)**

1. To study the composition of food products.
2. Disassemble what are foreign, potentially dangerous compounds of anthropogenic or natural origin - contaminants, xenobiotics, foreign chemicals (ChVV), definition, classification (bio, chemo, radioxenobiotics).
3. To disassemble the main sources and ways of contamination of food and food raw materials by xenobiotics.

#### **Lesson 2. Hygienic regulation of food contamination (2 hours). Seminar press conference (2 hours).**

1. To study what are plant growth regulators, their classification, mechanism of action, permissible quantities.
2. To understand what fertilizers are - nitrogen, phosphorus, potash, micronutrient fertilizers, complex fertilizers, organic.
3. To study what is sewage (solid waste) and solid waste used for irrigation and fertilizer. Types of wastewater: domestic fecal, CB livestock complexes, industrial, mixed urban wastewater.

#### **Lesson 3. Characterization of individual xenobiotics. Food Hazards (2 hours) Seminar - Press Conference**

1. To study the characteristics of individual xenobiotics. Hygienic requirements for them according to TR TS. Rationing of nitrates, nitrites as food additives.
2. Identify and clarify the main sources of nitrates and nitrites in food raw materials and food products. The reasons for the increased content of nitrates and



nitrites in vegetables. The biological effect of nitrates and nitrites on the human body. Technological methods for reducing nitrates in food raw materials.

3. To study the concept of pesticides, their classification by toxicity, by cumulative properties, by resistance. Hygienic characteristics of pesticides: OCP, FOP, ROP. Technological methods for reducing residual pesticides in food products.

#### **Lesson 4. Anti-nutritional nutritional factors (2 hours)**

1. To study the dangers associated with a shortage or excess of nutrients in the diet: protein, fats, carbohydrates, vitamins, minerals in the diet.

2. Disassemble digestive enzyme inhibitors; cyanogenic glycosides; biogenic amines; alkaloids; anti-vitamins.

3. Disassemble social toxicants: drugs, tobacco smoke and smoking; caffeinated and alcoholic drinks. Toxic effect. Types of addiction.

#### **Lesson 5. Food contamination with toxic metals (2 hours) Seminar press conference.**

1. To study what toxic metals are: lead, cadmium, arsenic, mercury, copper, chromium, tin. Distribution in nature, industrial use, metal sources, content in food products.

2. To analyze the characteristics of diseases caused by the toxic effects of metals, the prevention of pollution.

3. To characterize nitroso compounds and their toxic characteristics. Hygienic regulation. Pollution prevention

#### **Lesson 6. Characterization of individual xenobiotics. Radionuclide contamination (2 hours). Seminar - Press Conference**

1. To consider the radioactive background and the problems of its reduction. Possible ways of contamination of food products.

2. To study cosmic radiation, natural and artificial radionuclides. Prevention of accumulation of radionuclides in the body.

3. To analyze the radiation safety standards SP 2.6.1.758 - 99 (NRB-99). Products with radioprotective action. Normalized radionuclides (cesium,

strontium).

**Lesson 7. Safety indicators of raw materials and products of animal origin according to ND RF and TR CU (5 hours)**

1. To consider the safety indicators of raw milk, sterilized milk, dairy products. Sourdough, their safety, safety indicators.
2. To study the safety indicators of raw meat and meat products, smoked meats, sausages, etc.
3. To analyze the safety indicators of poultry and its processed products, eggs and egg products.

**Lesson 8. Safety indicators of raw materials and fishery and non-fish products ND RF and TR CU (2 hours) Seminar - press conference**

1. Consider microbiological standards, pathogenic standards, parasitological indicators of fish and crustacean safety.
2. To analyze the safety indicators of fish and fish products (fresh fish, salted, smoked, dried, dried, etc.).
3. To analyze the safety indicators of fish semi-finished products and culinary products; preserves, fish caviar, etc.

**Lesson 9. Food contamination with microorganisms and their metabolites (2 hours). Seminar - Press Conference**

1. Determine what is the biosafety of food raw materials and food products.
2. To analyze the characteristics of microbiological standards. Find out what are pathogenic standards, parasitological indicators of the safety of fish and crustaceans according to TR CU and ND RF.
3. To analyze the characteristics of microbiological safety indicators of animal and vegetable products.

**Lesson 10. Normative legal regulation of the activities for the circulation of GM raw materials and food products in the Russian Federation (2 hours)**

1. Consideration and analysis of certain provisions "On state regulation in the field of genetic engineering activity" dated 05.07.1996 N 86-Φ3.
2. Consideration and analysis of certain provisions of Government Decisions

relating to the regulation of activities for the circulation of GM raw materials and food products in the Russian Federation.

3. Consideration and analysis of certain provisions of the Decisions of the Chief State Sanitary Inspector in the field of regulation of activities on the circulation of GM raw materials and food products in the Russian Federation.

### **Lesson 11. State registration of genetically modified organisms in the Russian Federation (2 hours)**

1. Consideration and analysis of the procedure for state registration of genetically modified organisms intended for release into the environment, as well as products obtained with the use of such organisms or containing such organisms, including these products imported into the territory of the Russian Federation.

2. Charting the distribution of types of products in the following segments: soybeans, soybeans, soybean meal; corn, corn; sugar beets, rice; potatoes; protein-vitamin-mineral concentrates (BVMK), whole milk substitutes and other types of animal feed; food and biologically active food additives for humans; technological aids, enzyme preparations, etc. (according to the website <https://gmo.rosminzdrav.ru/>).

3. Compilation of a distribution chart by type of intended use: production of feed and feed additives, breeding and (or) cultivation, etc. (according to the site <https://gmo.rosminzdrav.ru/>).

4. Establishing the ratio between domestic and foreign products presented on the Russian market (according to the site <https://gmo.rosminzdrav.ru/>)

### **Lesson 12. Examination of GMO products. Safety assessment of GM foods. (2 hours)**

1. Definition of safety criteria for GM raw materials and food products.

2. Medical genetic assessment of the safety of GM raw materials and food products: the procedure, safety indicators, institutions involved in the examination.

3. Biomedical assessment: procedure, safety indicators, institutions conducting the examination.

4. Technological assessment: procedure, safety indicators, institutions

involved in the examination.

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

Educational and methodological support for independent work of students in the discipline "Safety of food raw materials and food products" 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**

№	Controlled modules / sections / topics of the discipline	Codes and stages of formation of competencies		Evaluation tools	
				Current control	Intermediate certification
1	Module 1 Hygienic requirements for indicators of quality and safety of food products	PC-11	Knows -Sanitary and hygienic requirements; -order organization of biotechnological processes and production	UO-1	Exam Questions 1-75
		PC-12			
		PC-16			
		PC-18		UO-3	Exam Questions 1-75
		PC-20		PR-3	
			Able to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition		
			Possesses skills in process control and production; methods for ensuring the stability of production indicators; sanitary-microbiological control of production	PR-2	Exam Questions 1-75

2	Module 2. Biological safety of individual food systems.	PC-11 PC-12 PC-16 PC-18 PC-20	Knows biosafety regulations	UO-1 PR-1	Exam Questions 1-75
			Able to ensure the biological safety of raw materials, semi-finished products, finished products	UO-3 PR-3 Essay	Exam Questions 1-75
			Owens the skills of organizing work on the development of new methods and means of technical control of biological safety; -methodology for assessing compliance with environmental and biological safety requirements; - Skills in the analysis of the state of technical control of product quality in production	PR-2	Exam Questions 1-75

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**

*(electronic and print editions)*

1. Poznyakovsky V.M. Hygienic fundamentals of nutrition, quality and food safety [Electronic resource]: textbook / Poznyakovsky VM - Electron. textual data. - Saratov: University education, 2014.— 453 p .— Access mode: <http://www.iprbookshop.ru/4175.html>.

2. The safety of food raw materials and food products [Electronic resource]: a training manual / I.A. Rogov [et al.]. - Electron. textual data. — Saratov: Higher education, 2014. — 226 pp. — Access mode: <http://www.iprbookshop.ru/4176.html>.

3. The safety of food raw materials and food [Electronic resource]: a training manual / A.D. Dimitriev [et al.]. - The electron. Dan. - Kazan: KNITU, 2016 .-- 188 p. - Access mode: <https://e.lanbook.com/book/102022>.

4. Examination of specialized food products. Quality and safety [Electronic resource]: study guide / L.A. Mayurnikova [et al.]. - The electron. Dan. - St. Petersburg: GIORD, 2016 .-- 448 p. - Access mode: <https://e.lanbook.com/book/69878>.

5. Lakiza N.V. Analysis of food products [Electronic resource]: textbook / Lakiza N.V., Neudachina L.K. - Electron. textual data. — Yekaterinburg: Ural Federal University, DIA EBS, 2015. — 188 pp. — Access mode: <http://www.iprbookshop.ru/69578.html>.

6. Kalenik, T.K. Commodity research and examination of food products obtained from genetically modified sources: quality and safety: a textbook for universities / T.K. Kalenik, L.N. Fedyanina, T.V. Tanashkina. - Rostov-on-Don: Publishing Center "Mart"; Phoenix, 2010 .-- 223 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo{5757125&theme=FEFU>

7. Standards and product quality: a training manual for universities / Yu. N. Bernovsky. Moscow: Forum, [Infra-M], 2014. - 255 p. <http://lib.dvfu.ru:8080/lib/item?id=chamo:752776&theme=FEFU>

### **Additional literature**

*(electronic and print editions)*

1. Poznyakovsky V.M. Examination of food concentrates. Quality and safety [Electronic resource]: training manual / Poznyakovsky V.M., Reznichenko I.Yu.,

Popov A.M. - Electron. textual data. — Saratov: Higher education, 2014. — 233 pp. — Access mode: <http://www.iprbookshop.ru/4170.html>.

2. Krasnikova L.V. Microbiological safety of food raw materials and finished products [Electronic resource]: teaching aid / Krasnikova LV, Gunkova PI - Electron. textual data. — SPb .: ITMO University, Institute of Refrigeration and Biotechnology, 2014. — 89 c. — Access mode: <http://www.iprbookshop.ru/67301.html>.

3. Royev, N.N. The safety of food raw materials and food [Electronic resource]: a training manual / N.N. Royev. - The electron. Dan. - St. Petersburg:, 2011. - 256 p. - Access mode: <https://e.lanbook.com/book/90703>.

4. Commodity research and examination of poultry meat, eggs and their processed products. Quality and safety [Electronic resource]: textbook / O.K. Motovilov [et al.]; under the editorship of Poznyakovskiy V.M .. - Electron. Dan. - St. Petersburg: Doe, 2016 .-- 320 p. - Access mode: <https://e.lanbook.com/book/71724>.

5. Cheremushkina, I.V. Safety of food raw materials and food: microbiological aspects. In 2 hours. Part 1 [Electronic resource]: study guide / I.V. Cheremushkina, N.N. Popova, I.P. Shchetilina. - The electron. Dan. - Voronezh: VGUIT, 2013 .-- 98 s. - Access mode: <https://e.lanbook.com/book/71648>.

6. Stepanova, I.V. Sanitation and food hygiene [Electronic resource]: study guide / I.V. Stepanova. - The electron. Dan. - St. Petersburg:, 2014 .-- 224 p. - Access mode: <https://e.lanbook.com/book/90684>.

7. Gunkova, P.I. Fundamentals of sanitary-hygienic control in the food industry [Electronic resource]: teaching aid / P.I. Gunkova, L.V. Krasnikova. - The electron. Dan. - St. Petersburg: NRU ITMO, 2016 .-- 97 p. - Access Mode: <https://e.lanbook.com/book/91377>

8. Gabelko S.V. The safety of food raw materials and food. Part 1 [Electronic resource]: textbook / Gabelko SV - Electron. textual data. — Novosibirsk: Novosibirsk State Technical University, 2012. — 183 c. Access mode: <http://www.iprbookshop.ru/44901.html>.

9. Golubtsova, Yu.V. Sanitation and hygiene at the enterprises of the biotechnological industry [Electronic resource]: study guide / Yu.V. Golubtsova, O.V. Krieger. - The electron. Dan. - Kemerovo: KemSU, 2016 .-- 101 p. - Access mode: <https://e.lanbook.com/book/103932>.

10. Ezhkova, M.S. Veterinary sanitary examination. Part 2. Biological safety of raw materials and animal products [Electronic resource]: textbook / M.S. Ezhkova. - The electron. Dan. - Kazan: KNITU, 2013 .-- 188 p. - Access mode: <https://e.lanbook.com/book/73229>.

11. Seregin, S.A. Biologically active additives in the production of products from animal raw materials [Electronic resource]: study guide / S.A. Seregin. - The electron. Dan. - Kemerovo: KemSU, 2014 .-- 104 p. - Access mode: <https://e.lanbook.com/book/60197>.

12. Pavlovich, S.A. Medical parasitology with entomology [Electronic resource]: study guide / S.A. Pavlovich, V.P. Andreev. - The electron. Dan. - Minsk: "Highest School", 2012. - 311 p. - Access Mode: <https://e.lanbook.com/book/65460>

13. Dotsenko, V.A. A practical guide to the sanitary supervision of enterprises in the food and processing industry, public catering and trade [Electronic resource]: study guide / V.A. Dotsenko. - The electron. Dan. - St. Petersburg: GIORD, 2012 .-- 832 p. - Access Mode: <https://e.lanbook.com/book/4885>

14. Examination of processed products of fruits and vegetables. Quality and safety [Electronic resource]: training manual / I.E. Tsapalova [et al.] .— Electron. textual data. — Saratov: Higher education, 2014. — 334 c. — Access mode: <http://www.iprbookshop.ru/4171.html>

15. Skvortsova, N.N. Fundamentals of Genetic Engineering [Electronic resource]: teaching aid / N.N. Skvortsova. - The electron. Dan. - St. Petersburg: NRU ITMO, 2015. - 58 p. - Access mode: <https://e.lanbook.com/book/91514>.



## **Regulatory materials**

1. Federal Law "On Protection of Consumer Rights" No. 2-FZ of 12/17/99.
2. Federal Law "On the Sanitary and Epidemiological Well-Being of the Population" No. 52-FZ of March 30, 1999.
3. The Federal Law "On Quality and Food Safety" No. 29-Φ3 dated 02.01.00.
4. The Federal Law "On Environmental Protection" No. 7-FZ of 10.01.02
5. GOST R 51047-97 "Food products. Information for the consumer. "
6. SanPiN 2.3.2.1078-01 Hygienic requirements for safety and nutritional value of food products. Sanitary and epidemiological rules and regulations.
7. SanPiN 2.1.4.1074-01 Drinking water. Hygienic requirements for water quality of centralized drinking supply systems.
8. SanPiN 2.3.2.1324-03 Hygienic requirements for shelf life and storage conditions.
9. SP 3.1 / 3.2. 1379-03 General requirements for the prevention of infectious and parasitic diseases.
10. The order of the sanitary-epidemiological examination of products / Approved. By order of the Ministry of Health of the Russian Federation of August 15, 2001 No. 325 /.
11. SanPiN 2.3.2.560-96 Hygienic requirements for the quality and safety of food raw materials and food products

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

### **"Internet"**

1. <http://elibrary.ru> Scientific Electronic Library eLIBRARY.RU
2. The electronic library system "Doe" <http://e.lanbook.com/>
3. The electronic library system "IPRBOOK" <http://www.iprbookshop.ru>
4. Scopus database: <http://www.scopus.com/home.url>
5. Web of Science Database <http://apps.webofknowledge.com/>

6. Database of full-texting academic journals in China <http://oversea.cnki.net/>
7. The electronic library of dissertations of the Russian State Library <http://diss.rsl.ru/>
8. EBSCO Electronic Databases <http://search.ebscohost.com/>

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

- Microsoft Office Professional Plus 2010 office suite, which includes software for working with various types of documents (texts, spreadsheets, databases, etc.);
- 7Zip 9.20 - a free file archiver with a high degree of data compression;
- ABBYY FineReader 11 - a program for optical character recognition;
- Adobe Acrobat XI Pro - a software package for creating and viewing electronic publications in PDF format;
- ESET Endpoint Security - comprehensive protection of Windows-based workstations. Virtualization support + new technologies;
- WinDjView 2.0.2 - a program for recognizing and viewing files with the same format DJV and DjVu;

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

To ensure a systematic and regular work on the study of the discipline and the successful passage of intermediate and final control tests, the student is recommended to adhere to the following learning procedure:

1. Independently determine the amount of time required to work out each topic.
2. Regularly study each topic of the discipline, using various forms of individual work.
3. Coordinate with the teacher the types of work to study the discipline.

4. Upon completion of certain topics, transfer completed work (essays, essays) to the teacher.

The theoretical part of the discipline is revealed in lectures, since a 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. During the lecture, it is recommended to draw up a compendium that fixes the main provisions of the lecture and key definitions on the topic covered.

Practical work is aimed at developing students' independent research work skills. In the course of practical exercises, students' knowledge is deepened and consolidated in a number of general issues discussed at lectures in the field of assessing the biological safety of goods (legislative and regulatory acts of the Russian Federation, the Customs Union, standards, certificates of conformity, sanitary and epidemiological conclusions, etc.), safety studies and the biological safety of raw materials and food products using the main methods in accordance with ND, systematization, generalization, taking control and prevention measures for their contamination.

In the process of preparing for practical exercises, students can take advantage of the teacher's advice.

Questions of the work program of the discipline, not included in the classroom work, should be studied by students in the course of independent work. Control of students' independent work on the curriculum of the course is carried out by oral questioning or through testing. In the course of independent work, each student is obliged to read the main and, if possible, additional literature on the topic under study, supplement lecture notes with missing material, extracts from recommended primary sources.

When studying the discipline "Safety of food raw materials and food products" the following types of students' independent work are used: search (selection) of literature (including electronic sources of information) on a given

topic, a comparative analysis of scientific publications; development and presentation of presentations on given topics; essay writing, preparation and participation in student research conferences. To prepare for classes, ongoing monitoring and intermediate certification, students can use the FEFU scientific library, the electronic catalog of which is located at the electronic address [www.dvfu.ru/library](http://www.dvfu.ru/library), where they have the opportunity to access educational materials, both university libraries and other electronic library systems. In turn, students can take home the necessary literature at the library subscription, as well as use the reading rooms of the university. In agreement with the teacher, the student can prepare an essay, report, presentation or message on the discipline section. In the process of preparation, students can take advantage of the teacher's advice. Education involves, basically, independent study of educational material by a student using electronic teaching aids, as well as textbooks and other reference books.

For the exam in the discipline "Safety of food raw materials and food products" should begin with the first lesson. The exam is held on the appointed day, at the end of the discipline. During the exam, the teacher takes into account the student's activity in class, the quality of independent work, tests, and test tasks.

## VII. LIST OF INFORMATION TECHNOLOGIES AND SOFTWARE

Licensed software installed on a PC at the School of Biomedicine and used as part of mastering the discipline:

Name of the software package	Version	Purpose
Windows Seven Enterprise	SP3x64	operating system
Eset NOD32 Antivirus	4.2.76.1	Malware detection tool
Microsoft Office 2010 Professional Plus	14.0.6029.1000	Office package
Microsoft Office Professional Plus 2013	15.0.4420.1017	Office package
7-Zip	9.20.00.0	Educational software package
AbbyyFineReader 11	11.0.460	Educational software package
CoogoleChrome	42.0.2311.90	WWW browser

## VII. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE

Material and technical support for the implementation of the discipline includes classrooms for lectures and practical exercises equipped with multimedia support.

Name of equipped rooms and premises for independent work	List of main equipment
Biosafety and Bioprotection Laboratory, Vladivostok, Russky Island, Ajax, 10, Building 25.1, aud. M309	Training furniture for 10 jobs. Amplifier automatic model 4-channel RT-PCR Eco Real-Time PCR / USA; Fluorate - 02-05M liquid analyzer; IR-Fourier spectrometer, model IRaffinity-1 Manufacturer 'Shimadzu'; Spectrophotometer for the analysis of the micro-quantity of nucleic acids, model BioSpec-nano; Spectrophotometer scanning model UV-1800. Manufacturer 'Shimadzu', Monoblock MSI AE1920-093 Atom D525 / 2G / 250GB; polarimeter automatic PoAAr.
Laboratory of Problems of Quality and Food Safety Vladivostok, Russian Island Ajax d 10, Building 25.1 room 425	Thermostat water T-250; The microscope is monocular. Microscope chamber, GP-80 SPU Sterilizer, Ocean-4 refrigerator, Scales, Bactericidal irradiator OBN 150 2x30 wall AZOV (set) 101-230472, Microscope Biomed 10 pcs., Microorganism colony counter SKM-1, electric dream plate 111CH 101-226589; PE-6110 magnetic stirrer with heating.
Reading rooms of the FEFU Scientific Library with open access to the fund (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
Audience for independent work of students in Vladivostok, Russian Island, 10 Ajax, Building 25.1, auditorium 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).



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ  
ФЕДЕРАЦИИ

Федеральное государственное автономное образовательное учреждение  
высшего образования

«Дальневосточный федеральный университет»  
(ДВФУ)

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**ШКОЛА БИОМЕДИЦИНЫ**

**УЧЕБНО-МЕТОДИЧЕСКОЕ ОБЕСПЕЧЕНИЕ САМОСТОЯТЕЛЬНОЙ  
РАБОТЫ ОБУЧАЮЩИХСЯ**

**по дисциплине «Безопасность и биобезопасность агропродовольственного  
сырья и пищевых продуктов»**

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

**Форма подготовки очная**

**Владивосток**

**2021**

## **Schedule of independent work on the discipline**

<b>№</b>	<b>Date / Deadline</b>	<b>Type of independent work</b>	<b>Estimated time to complete</b>	<b>Form of control</b>
1	1-17 week	Self-training	8	Tests
3	5-6 week	Homework	2	Essay
4	10-14 week	Presentation Preparation	2	Presentation
5	17-18 week	Exam preparation	6	Interview
		Total	18	

When studying the discipline “Safety and biosafety of agri-food raw materials and food products”, the following types of students' independent work are used: search (selection) of literature (including electronic sources of information) on a given topic, a comparative analysis of scientific publications; development and presentation of presentations on given topics; essay writing, preparation and participation in student research conferences.

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 a scientific and theoretical part, and the second analyzes the practice).

### **Self-study topics**

1. Features of the microbiology of raw materials and products from animal origin.
2. Microbiology, microbiological quality control of milk and dairy products.
3. Microbiology, microbiological quality control of meat and meat products.
4. Microbiology, microbiological quality control of poultry meat and products of its processing.

5. Microbiology, microbiological quality control of eggs, egg products.
6. Microbiology, microbiological quality control of fish and fish products.
7. State policy of the Russian Federation in the field of quality and safety of food products. The main provisions of the Federal Law of the Russian Federation "On the quality and safety of food products" from 2.01.2000; Federal Law of the Russian Federation "On the Sanitary and Epidemiological Well-Being of the Population" (Articles 15, 43, 16): Technical Regulations of the Customs Union (TR CU). Terms, definitions, meaning for the specialty.
8. Microbiological standards for TR TS. Pathogenic standards for TR TS.
9. Microorganisms and their toxins. Regulation of microorganisms according to TR TS.
10. Microbiological safety indicators of raw materials and products of animal and vegetable origin in accordance with the RF ND and the Customs Union.
11. Mycotoxins, their regulation: aflatoxins, characterization and prevention of aflatoxicosis. Hygienic regulation of aflatoxin.
12. Hygienic characteristics of trichothecenes (T-2 toxin, vomitoxin). Characterization of fusariotoxicosis, toxic aleukia, level disease, trichothecenosis. Hygienic characteristics of ergotoxins, zearalenone, patulin.
13. Food contamination with helminths. Basic terms, types of helminths, ways and types of human infection. Characterization of certain types of helminthiases transmitted alimentary (ascariasis, trichocephalosis, hymenolipidosis, enterobiosis).
14. Microbiological, pathogenic standards, parasitological indicators of the safety of fish and crustaceans.

### **Guidelines for preparing presentations**

To prepare the presentation, it is recommended to use: PowerPoint, MS Word, Acrobat Reader, LaTeX package beamer. The simplest presentation



program is Microsoft PowerPoint. To prepare a presentation, it is necessary to process the information collected during the writing of the abstract.

Presentation preparation sequence:

1. Clearly articulate the purpose of the presentation.
2. Determine what the presentation format will be: live performance (then, how long will it be) or electronic distribution (what will be the context of the presentation).
3. Select the entire content for presentation and build a logical chain of presentation.
4. Identify key points in the text and highlight them.
5. Determine the types of visualization (pictures) to display them on slides in accordance with the logic, purpose and specifics of the material.
6. Choose a design and format slides (number of images and text, their location, color and size).
7. Check the visual perception of the presentation.

Types of visualization include illustrations, images, charts, tables. Illustration is a representation of a real existing visual range. Images - unlike illustrations - are a metaphor. Their purpose is to evoke emotion and create an attitude towards it, to influence the audience. With the help of well-designed and presented images, information can remain in the human memory for a long time. Chart - visualization of quantitative and qualitative relationships. They are used to convincingly demonstrate data, for spatial thinking in addition to logical. A table is a concrete, visual and accurate display of data. Its main purpose is to structure information, which sometimes facilitates the perception of data by the audience.

Practical tips for preparing a presentation:

- printed text + slides + handouts are prepared separately;
- slides - visual presentation of information, which should contain a minimum of text, a maximum of images that carry a semantic load, look clear and simple;

- text content of the presentation - oral speech or reading, which should include arguments, facts, evidence and emotions;
- recommended number of slides 17-22;
- mandatory information for the presentation: topic, last name and initials of the speaker; message plan; brief conclusions from all that has been said; list of sources used;
- handout - should provide the same depth and coverage as a live performance: people have more confidence in what they can carry with them than disappearing images, words and slides are forgotten, and handouts remain a constant tangible reminder; handouts are important at the end of the presentation; handouts should be different from slides, should be more informative.

### **Presentation Subject**

1. Safety indicators of raw materials and products of animal origin according to ND RF and TR CU.
2. Microbiological, pathogenic standards, parasitological indicators of fish and crustacean safety.
3. Biological safety indicators of raw milk, sterilized milk, dairy products. Sourdough, their safety, safety indicators.
4. Biological safety indicators of fish and fish products (fresh fish, salted, smoked, dried, dried; semi-finished fish products and culinary products, preserves, fish roe. Main non-fish seafood.
5. Biological safety indicators of meat and meat products, smoked meats, sausages.
6. Indicators of biological safety of poultry and its processed products, eggs and egg products.
7. Biological safety indicators of raw materials and products of plant origin according to ND RF and TR CU. Microbiological standards, pathogenic standards.

8. Biological pollutants to be controlled in various groups of food raw materials and food products.

9. Contaminants to be controlled in grain and grain products: pesticides, mycotoxins (aflatoxins: B1, zearalenone, vomitoxin).

10. Biological pollutants to be controlled in meat and meat products.

11. Biological Contaminants to be controlled in milk and dairy products.

12. Mycotoxins (aflatoxin B), deoxynivalenol (vomitoxin), zearalenone, T-2, toxin, patulin - their regulation in food raw materials, food of plant origin, aflatoxin M, in milk and dairy products.

13. Biological pollutants to be controlled in vegetables, fruits, potatoes: pesticides, nitrates, patulin.

14. The epidemiological significance of raw materials and products from animal raw materials.

15. The epidemiological significance of raw materials and products from plant materials..

### Presentation Evaluation Criteria:

Mark	5 points (unsatisfactory)	6-7 points (satisfactory)	8-9 points (good)	10-12 points (excellent)
Criteria	The content of the criteria			
Disclosure of the problem	The problem is not solved. Missing conclusions	The problem is not fully disclosed. Conclusions are not made and / or conclusions are not substantiated.	The problem is solved. The analysis of the problem without involving additional literature. Not all conclusions are made and / or substantiated	The problem is fully disclosed. The analysis of the problem with the involvement of additional literature. The conclusions are justified.
Performance	The information provided is not logically related. No professional terms used	The information provided is not systematized and / or inconsistent. 1-2 professional terminologies used	The information provided is not systematic and consistent. More than 2 professional terms used.	The information presented is systematized, consistent and logically connected. More than 5 professional terms used.
form alization	Not used Power Point technology.	Partial Power Point technologies used.	Used Power Point technology. No more than	Widely used technology (Power

	More than 4 errors in the information provided	3-4 errors in the information provided	2 errors in the information provided	Point, etc.). There are no errors in the information provided.
<b>Answers on questions</b>	No answers to questions.	Only answers to basic questions	Full and / or partially complete answers to questions	The answers to the questions are complete, with the appearance of examples and / or explanations

- 9 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. 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

- 7-8 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

- 6-5 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 sense or content of the problem, the design of the work.

- 4 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.

## **Subject of the essay**

1. Biological safety and microorganisms.
2. Problems of food contamination with staphylococcus.
3. Food contamination with mycotoxins. The relevance of the problem.
4. Food poisoning. The relevance of the problem.
5. Dangers of microbial origin: foodborne infections.
6. Food contamination with helminths. Urgency of the problem
7. Problems of food contamination with salmonellosis.
8. Food contamination by botulism.
9. Food contamination aflatoxins. Urgency of the problem
10. Problems of food contamination with mycotoxicosis.
11. Sanitary microorganisms in food commodities
12. Principles for determining food safety by microbiological indicators.
13. The main microbiological indicators of the quality of food products.
14. Microflora of fresh fruits and vegetables.
15. Microbiology of fish and fish products
16. Microbiology of milk, its change during storage.
17. Microbiology of dairy products.
18. Microbiology of eggs and egg products.
19. Microbiology of finished meat products
20. Microbiology of fresh meat, chilled and frozen



МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ  
ФЕДЕРАЦИИ

Федеральное государственное автономное образовательное учреждение  
высшего образования

«Дальневосточный федеральный университет»  
(ДВФУ)

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**ШКОЛА БИОМЕДИЦИНЫ**

**ФОНД ОЦЕНОЧНЫХ СРЕДСТВ**

по дисциплине «Безопасность и биобезопасность агропродовольственного  
сырья и пищевых продуктов»

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

Форма подготовки очная

**Владивосток**

**2021**

## FOS Passport

Code and wording of competency	Competency Stages	
PC-11 the ability to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	knows	the procedure for ensuring technological discipline, sanitary-hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	Able to	provide technological discipline, sanitary and hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
	owns	skills to ensure technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition
PC-12 the ability to plan and carry out activities to ensure industrial safety, environmental monitoring and protection	knows	<ul style="list-style-type: none"> <li>- regulatory legal documents in their activities;</li> <li>- requirements for industrial safety</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>- classify legal documents in their professional activities;</li> <li>- use legal documents in their activities;</li> <li>- plan measures to ensure industrial safety, environmental monitoring and protection</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- acquired knowledge in professional activities;</li> <li>- an independent analysis of scientific literature;</li> <li>- the ability to carry out activities to ensure safety at work, to monitor and protect the environment</li> </ul>
PC-16 ability to carry out effective work of control, automation and automated production control, chemical-technical, biochemical and microbiological control	knows	<ul style="list-style-type: none"> <li>- The principle of control, automation and automated production management, chemical-technical, biochemical and microbiological</li> <li>- sanitary and hygienic requirements in the work of enterprises;</li> <li>- the procedure for organizing biotechnological processes and industries;</li> <li>- features of the technological process based on technological regulations; the scientific basis for increasing efficiency.</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>use modern methods of physico-chemical, biochemical and microbiological control and quality analysis based on standard and certification tests;</li> <li>ensure the maintenance of technological equipment in proper technical condition;</li> <li>plan the work of biotechnological processes and industries;</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- Department of production and chemical-technical, biochemical and microbiological control</li> <li>- provide technological discipline;</li> <li>- management skills of existing biotechnological processes and industries;</li> <li>- methods to ensure the stability of production indicators.</li> </ul>
PC-18 the ability to develop and scientifically substantiate schemes for the optimal integrated	knows	<ul style="list-style-type: none"> <li>- requirements of the standards of the quality management system of biotechnological production;</li> <li>- methodological documents for product quality management;</li> <li>- requirements for the organization of work with personnel.</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>- carry out the process in accordance with the regulations;</li> </ul>

certification of biotechnological products		<ul style="list-style-type: none"> <li>- use instrumentation in the production of biotechnological products;</li> <li>- use the basic principles of organization of metrological support of production;</li> <li>- plan and carry out activities to ensure industrial safety.</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- methods in the field of quality management system of biotechnological production;</li> <li>- skills of operational control at all stages of the production process for compliance with quality standards and technical conditions.</li> </ul>
PC-20 the ability to ensure the biological safety of raw materials, semi-finished products, finished products	knows	<ul style="list-style-type: none"> <li>- requirements for environmental and biological safety of raw materials and finished products;</li> <li>regulatory and methodological documents</li> <li>- regulatory issues of product quality; –</li> <li>-normative and methodological documents regulating the requirements for materials, semi-finished products, purchased products and finished products</li> </ul>
	Able to	<ul style="list-style-type: none"> <li>-to assess the conformity of raw materials and finished products to environmental and biological safety requirements;</li> <li>-determine the need to develop new methods and means of measurement;</li> <li>-exploit basic technological and laboratory equipment</li> </ul>
	owns	<ul style="list-style-type: none"> <li>- the skills of organizing work on the development of new methods and means of technical control of biological safety;</li> <li>-methodology for assessing compliance with environmental and biological safety requirements;</li> <li>- Skills in the analysis of the state of technical control of product quality in production</li> </ul>

№	Controlled modules / sections / topics of the discipline	Codes and stages of formation of competencies		Evaluation tools	
				Current control	Intermediate certification
1	Module 1 Hygienic requirements for indicators of quality and safety of food products	PC-11 PC-12 PC-16 PC-18 PC-20	Knows	UO-1 PR-1	Exam Questions 1-75
			-Sanitary and hygienic requirements;		
			-order organization of biotechnological processes and production		
	Able to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	UO-3 PR-3	Exam Questions 1-75		
	Possesses skills in process control and production; methods for ensuring the stability of production indicators; sanitary-	PR-2	Exam Questions 1-75		



			microbiological control of production		
2	Module 2. Biological safety of individual food systems.	PC-11	Knows biosafety regulations	UO-1 PR-1	Exam Questions 1-75
		PC-12 PC-16 PC-18 PC-20	Able to ensure the biological safety of raw materials, semi-finished products, finished products	UO-3 PR-3 Essay	Exam Questions 1-75
			Owns the skills of organizing work on the development of new methods and means of technical control of biological safety; -methodology for assessing compliance with environmental and biological safety requirements; - Skills in the analysis of the state of technical control of product quality in production	PR-2	Exam Questions 1-75

### Competency Level Assessment Scale

Code and wording of competency	Competency Stages		Criteria	Indicators
PC-11 the ability to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, the maintenance of technological equipment in proper technical condition	Knows (threshold level)	-Sanitary and hygienic requirements for the work of enterprises; - the procedure for organizing biotechnological processes and production	Knowledge of hygiene requirements; - the procedure for organizing biotechnological processes and production	Knows hygiene requirements - the procedure for organizing biotechnological processes and production
	Able to (advanced)	- ensure the maintenance of technological equipment in proper technical condition; -use modern methods of physicochemical, biochemical and microbiological quality control and analysis based on standard and certification tests	Ability to provide technological discipline, sanitary-hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition	Able to provide technological discipline, sanitary-hygienic mode of operation of the enterprise

	Owns (high)	Provide technological discipline; management skills of existing biotechnological processes and industries; -Sanitary and microbiological production control	skills to ensure technological discipline, sanitary-hygienic mode of operation of the enterprise, maintenance of technological equipment in proper technical condition	Able to provide technological discipline, sanitary and hygienic operation of the enterprise, the maintenance of technological equipment in proper technical condition
PC-12 the ability to plan and carry out activities to ensure industrial safety, environmental monitoring and protection	Knows (threshold level)	- industrial safety regulations; - regulatory legal documents; - normative and methodological documents regulating the organization of jobs; - technological parameters and production equipment;	Knowledge of regulatory legal documents on ensuring safety measures, on monitoring and environmental protection	knows the regulatory legal documents on ensuring safety measures, on monitoring and environmental protection
	Able to(advanced)	- classify legal documents in their professional activities; - plan measures to ensure industrial safety, monitoring and environmental protection; - analyze the scientific and technical information of domestic and foreign experience on the latest achievements in relation to the field of their professional activity; - present the results of scientific research for discussion with a view to their implementation and use in practice;	Ability to plan and carry out safety measures, environmental monitoring and protection	Able to apply safety, environmental monitoring and protection rules
	Owns (high)	- scientific and technical documentation, recommendations for implementation and use in the production of biotechnological products -acquired knowledge in professional activities; - an independent analysis	Ability to apply knowledge in professional activities; analyze scientific literature; - to carry out	Formed the ability to apply knowledge in professional activities; analyze scientific literature; - to carry out measures to ensure industrial safety, monitoring and environmental

		of scientific literature; - the ability to carry out activities to ensure safety at work, to monitor and protect the environment	measures to ensure industrial safety, monitoring and environmental protection	protection
PC-16 ability to carry out effective work of control, automation and automated production control, chemical-technical, biochemical and microbiological control	Knows (threshold level)	-main hazards of food raw materials -criteria for assessing food safety - standards of maximum permissible levels of toxicity of food products and raw materials; -epidemiological significance of pathogenic flora in certain types of food	Knowledge of the safety of food raw materials and food	Formed knowledge of food safety factors and raw materials
	Able to(advanced)	Apply safety standards for food raw materials and food products	Ability to analyze, generalize, apply knowledge on food system safety	Able to analyze, generalize, apply knowledge on food system safety
	Owns (high)	Ensure food quality in accordance with regulatory requirements	Ability to apply food safety knowledge	The ability to apply food safety knowledge has been developed
PC-18 the ability to develop and scientifically substantiate schemes for the optimal integrated certification of biotechnological products	Knows (threshold level)	regulatory documents ensuring the safety of food raw materials and products	Knowledge of the main regulatory documents	Formed knowledge of the main regulatory documents
	Able to(advanced)	use regulatory documents on food safety; -assess the safety of food products according to accompanying documents	Ability to work with regulatory documents	Confidently working with regulatory documents
	Owns (high)	- skills in conducting control over the safety of food raw materials and food products; - documenting the results of the safety assessment of products and food raw materials; - drawing up recommendations for the disposal of raw materials in case of unsuitability for food purposes	The ability to analyze, execute, present documents in the required format	Сформировано умение работать с нормативно-правовыми документами

PC-20 the ability to ensure the biological safety of raw materials, semi-finished products, finished products	Knows (threshold level)	regulatory documents ensuring the biological safety of raw materials, semi-finished products	Knowledge of the main regulatory documents	Formed knowledge of the main regulatory documents
	Able to(advanced)	Conduct research on the assessment of raw materials, semi-finished products and technological processes	Ability to conduct research on the assessment of raw materials, semi-finished products and technological processes	Ability to conduct research on the assessment of raw materials, semi-finished products, finished products and technological processes
	Owns (high)	-basic methods and techniques for conducting hygienic research on the assessment of raw materials, semi-finished products, finished products and technological processes; -planning methodology and design of food enterprises taking into account compliance with sanitary requirements - Skills in the analysis of the state of technical control of product quality in production	Ability to apply methods and techniques of conducting hygienic research to assess raw materials, finished products, technological processes and methods of building food enterprises	Independently apply research methods for raw materials, finished products and technological processes, as well as the planning and design of food enterprises

### **Guidelines that determine the procedures for assessing the results of mastering the discipline**

**Current student certification.** The current certification of students in the discipline Safety of agri-food raw materials and food / Безопасность агропродовольственного сырья и пищевых продуктов is carried out in accordance with the local regulatory acts of FEFU and is mandatory.

The current certification in the discipline "Biological safety of food systems" is carried out in the form of control measures (survey, test, report, testing) to assess the actual results of student learning and is carried out by a leading teacher. The objects of evaluation are:

- academic discipline (activity in the classroom, the timely completion of various types of tasks, attendance of all types of classes in the certified discipline);
- the degree of assimilation of theoretical knowledge;
- the level of mastery of practical skills in all types of educational work;
- results of independent work.

**Interim certification of students.** Interim certification of students in the discipline "Biological safety of food systems" is carried out in accordance with local regulations of FEFU and is mandatory.

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

Interim certification of students in the discipline "Biological safety of food systems" is carried out in accordance with local regulations of FEFU and is mandatory.

The discipline provides an exam.

### **Questions for the exam**

1. Normative documentation adopted in the Russian Federation, providing bio-safety of food systems (laws, SanPiN, GOSTs, TR CU, etc.).
2. Types and classification of the main biological hazard factors of raw materials and goods, their impact on the human body.
3. The composition of food products, the importance of each component in terms of biological hazard.
4. Classification of harmful and foreign substances in drinking water, food raw materials, and food products. The main ways of contamination of food with biological agents.
5. Xenobiotics and bioxenobiotics food. Admissibility criteria for the concentration of bioxenobiotics in a food product.
6. The most dangerous bio-contaminants in terms of prevalence and toxicity.

7. Characterization of individual bio-contaminants. Bioxenobiotics. Microbiological safety criteria presented in the RF ND, TR TS.

8. Mycotoxins in foods. Prevention of nutritional mycotoxicosis.

9. Contaminants of a biological nature. Classification. Value.

10. The main indicators of the biological hazard of food systems. Measures for protection and prevention. Types and classification of the main biological hazards of raw materials and goods, their impact on the human body.

11. Bioksenobiotiki food. Criteria for the permissible concentration of bioxenobiotics in a food product.

12. General characteristics of microflora of raw materials and animal products. Features of the assessment of food products by microbiological indicators.

13. Sanitary microbiology of raw materials and animal products. Features of the assessment of raw materials and animal products by microbiological indicators. Definition, tasks, research methods.

14. Microbiological indicators of biological safety of food products. Regulatory documentation (ND) of the Russian Federation and TR CU.

15. ND of the Russian Federation (TR CU, Technical Regulations). Definition, purpose, practical value.

16. Technical regulations. Definition, purpose, practical value.

17. Technical Regulations of the Customs Union. Definition, purpose, practical significance

18. The main groups m / o defined in food products to assess their biological safety.

19. Features of sampling of raw materials and animal products. The main objectives of monitoring the microbiological indicators of the biological safety of products.

20. Sanitary-indicative m / o, classification, practical significance.

21. MAFANM in CFU / g (cm) 3 - definition, purpose, disadvantages and advantages in the study of food products.

22. Microbiological regulation of milk and dairy products in accordance with the RF ND, TS.

23. Microflora of raw milk, developmental phase. Malformations of milk of bacterial origin. Methods of control and prevention.

24. Microbiology of fermented milk products. Sourdough, their types. M / b indicators of fermented milk products. Types of defects m / b origin. Methods of control and prevention.

25. Milk and lactic acid products are nutritional factors for the transmission of intestinal infections. Diseases transmitted through milk and dairy products (intestinal infections, foodborne infections, staphylococcal toxicosis, etc.). Preventive measures.

26. Microbiology of meat and meat products. Types of damage, microbiological assessment, m / b indicators in accordance with the RF ND, TS.

27. Microbiology of poultry and products of its processing. Microbiological indicators of poultry products in accordance with the ND RF, TS.

28. The epidemiological role of meat and meat products, diseases transmitted through meat, meat products and poultry products. Preventive measures.

29. The microflora of eggs. Types and causative agents of egg damage.

30. Microbiological indicators of egg products in accordance with the ND RF, TS. Definition, value.

31. The epidemiological role of eggs and egg products, diseases transmitted through eggs, egg and poultry products. Preventive measures.

32. Microflora of fresh fish. Types of fish defects. Microbiological indicators of fish quality in accordance with ND RF, TS.

33. Features of sanitary-microbiological studies of fish and fish products in accordance with the RF ND, TS.

34. Types of microbiological damage to fish and fish products. Preventive measures.

35. Fish and fish products are nutritional factors for the transmission of

intestinal infections. Diseases transmitted through fish and fish products. Preventive measures.

36. Regulatory documentation of the Russian Federation, TS, ensuring the biological safety of raw materials and products HACCP system, Codex Alimentarius.

37. Aflatoxins. Toxicological and hygienic characteristics. Prevention of aflatoxicosis.

38. Food contamination with trichothecene mycotoxins (T-2 toxin, deoxynivalenol).

39. Food contamination by mold toxins: zearalenone. Prevention of pollution.

40. Food contamination by mold toxins: patulin. Pollution prevention.

41. Food contamination by mold toxins: ergotoxins. Prevention of pollution.

42. Helminthiasis. Classification. Conditions, ways and types of infection with helminths. The role of food.

43. Helminthiasis caused by roundworms (ascariasis), pinworms (enterobiosis), whipworm (trichocephalosis), dwarf tapeworm (hymenolipidosis) Prevention measures.

44. Food poisoning by poisonous plant products.

45. Food poisoning by poisonous animal products.

46. Application of the HACCP system (risk analysis and critical control points) to ensure food safety.

47. Current status of food safety problems. The problem of falsification of food. Hygiene requirements for food products.

48. Technical regulations establishing safety requirements for food products. The requirements established in them.

49. Genetic engineering and security issues.

50. Transgenic raw materials, features of use and control.

51. Veterinary-sanitary and technological monitoring of the production of environmentally friendly products.



52. The safety of packaging and packaging materials for food. Food Packaging Requirements. Legislative and regulatory documents establishing these requirements.

53. Contamination of food raw materials and food products by xenobiotics. Pollution of raw materials and food products from the environment.

54. Biological xenobiotics (sanitary indicative microorganisms, opportunistic microorganisms, pathogenic microorganisms, mycotoxins).

55. The metabolism of foreign compounds

56. Ways of contamination of food raw materials and food with chemical elements.

57. Contamination of food products and raw materials with substances and compounds used in crop production.

58. Pollution with dioxins and polycyclic aromatic hydrocarbons.

59. Radioactive contamination of food raw materials and food products.

60. Nutritional supplements: classification, hygienic rationing principles and application control.

61. The main ways of contamination of food and food raw materials.

62. Food poisoning of non-microbial origin.

63. Characterization of genetically modified raw materials for food production.

64. Requirements for ensuring the quality and safety of food raw materials and food products during storage, transportation and sale.

65. Food poisoning (food intoxication) and food poisoning.

66. Ways of contamination of food raw materials and food with chemical elements.

67. Contamination of food products and raw materials with substances and compounds used in crop production.

68. Pollution with dioxins and polycyclic aromatic hydrocarbons.

69. Radioactive contamination of food raw materials and food products.

70. Antialimentary nutritional factors.

71. Nutritional supplements: classification, hygienic rationing principles and application control.

72. Analysis of the regulatory framework for food safety in Russia and abroad.

73. Characterization of genetically modified raw materials for food production.

74. Food contamination with antibiotics and hormones.

75. Requirements for ensuring the quality and safety of food products, materials and products, the import of which is carried out on the territory of the Russian Federation

**Criteria for grading a student in the exam of the discipline  
Safety of agri-food raw materials and food / Безопасность  
агропродовольственного сырья и пищевых продуктов**

<b>Exam grade</b>	<b>Requirements for formed competencies</b>
“excellent”	The student is rated as “excellent” if he has deeply and firmly grasped the program material, sets out comprehensively, consistently, clearly and logically in harmony with him, knows how to closely relate theory to practice, freely copes with tasks, questions and other types of application of knowledge, and does not the answer when modifying tasks, uses the material of monographic literature in the answer, correctly substantiates the decision made, has versatile skills and techniques for performing practical tasks;
“good”	The student is rated “good” if he knows the material firmly, 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;
“Satisfactory”	A student is rated “satisfactory” if he has knowledge of only the main material, but has not learned its details, admits inaccuracies, insufficiently correct wording, violations of the logical sequence in the presentation of program material, has difficulty in performing practical work;
"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.

## **Evaluation tools for ongoing certification**

When working with tests, it is proposed to choose one answer option from the ones proposed. At the same time, the tests are not the same in complexity. Among the proposed there are tests that contain several options for the correct answers. The student must indicate all the correct answers.

Tests are designed for both individual and collective solution. They can be used in the process of classroom studies, and independent work. The selection of tests necessary to control knowledge in the process of intermediate certification is carried out by each teacher individually.

### **Sample test items**

#### **1. Quality control of food raw materials and food products.**

1. Food safety is (full answer):

A) compliance of food products with sanitary rules, norms and hygienic standards, veterinary and phytosanitary rules, compliance with which eliminates the dangerous effects on the life and health of people of present and future generations;

B) compliance of food products with sanitary rules, norms and hygienic standards, veterinary and phytosanitary rules, the observance of which eliminates a dangerous effect on human life and health; C) compliance of food products with sanitary rules, norms and hygienic standards, veterinary and phytosanitary rules, the observance of which eliminates the dangerous effects on the life and health of people of the current generation;

C) the conformity of food products to sanitary rules, norms and hygienic standards, veterinary and phytosanitary rules, the observance of which excludes a dangerous effect on the life and health of people of future generations;

D) full compliance of food products with all sanitary rules and hygienic

standards.

2. One of the main directions of improving food security of the population in the economically developed countries of the world at present is:

A) universal education of the population through appropriate programs for schools, secondary and higher educational institutions, as well as for the media;

B) the creation of special additional territorial controlling structures;

C) the creation of special federal regulatory agencies;

D) a complete ban on advertising in the media of all food products, including own production; E) a complete ban on advertising in the media food products only exported from other countries.

3. To ensure guaranteed food safety at processing plants in industrialized countries, a Hazard Analysis and Critical Control Point (HACCP) system is in place, which provides for:

A) a quality control system in the production of food products according to the level of risk criteria;

B) a quality control system in the production of transgenic food products obtained by genetic engineering;

C) a quality control system in the production of food products according to the microbiological hazard of individual ingredients;

D) a quality control system in the production of food products for their potential carcinogenic hazard;

E) a quality control system in the production of food products by their potential chemical hazard to humans.

4. The need to formulate and implement a scientific and technical policy in the field of healthy and safe nutrition for the Russian population is dictated by the particular importance of this problem, due to three main reasons:

A) a decrease in the consumption of fruits, mainly citrus;

- B) the deterioration of the demographic situation, including as a result of the growth of diseases caused by poor nutrition;
- C) an imbalance in nutrition;
- D) the consumption of substandard, falsified and hazardous to health food;
- E) an increase in the consumption of meat and products from it, in particular sausages with a high content of NaNO<sub>2</sub>.

5. The Federal Law of the Russian Federation “On the quality and safety of food products” dated 02.01.2000, No. 29-FZ:

A) ensures the creation of a legal framework governing relations in the chain production - consumption of food products, establishes the responsibility of state bodies and legal entities in the field of quality and safety of food products, as well as the rights and obligations of citizens and certain groups of the population in this area;

B) establishes the basic sanitary rules, norms and hygienic standards that are binding on both legal entities and individuals;

C) establish a system of supervision and control over the quality and safety of food products by specially created militarized municipal inspections;

D) establish a system of state regulation of the quantity and quality of transgenic products exported from abroad;

E) establish a system for licensing and certification of transgenic food products according to the submissions of local sanitary and epidemiological surveillance services and the public.

6. The main regulatory document establishing hygienic requirements for the quality and safety of food raw materials and food products, as well as indicators of their quality and safety:

A) SanPiN 2.3.2.560-96;

B) Federal Law of 23.02.92 No. 2300-1-FZ;

C) Federal Law of June 10, 1993 No. 5151-1-Federal Law;

- D) Federal Law of 06.06.96, No. 3348-FZ;
- E) Federal Law of March 30, 1999 No. 52-FZ;
- F) Federal Law of 02.01.2000 No. 29-FZ.

7. Mandatory product safety requirements are regulated by:

- A) GOST;
- B) GOST R;
- C) technical regulations.

8. Requirements for the quality of products are established by:

- A) GOST;
- B) GOST R;
- C) technical regulations.

## **2. Contamination of food raw materials and food products by xenobiotics of chemical and biological origin**

1. Contaminants are:

- A) food components containing secondary organic amines;
- B) all potentially dangerous compounds of exclusively anthropogenic origin;
- C) all potentially dangerous compounds of only natural origin;
- D) especially dangerous compounds of microbiological origin in food products;
- E) potentially dangerous compounds of anthropogenic or natural origin of inorganic and organic nature, including microbiological origin, in food products.

2. The greatest danger in terms of prevalence and toxicity of these contaminants do not represent (one correct answer):

- A) toxins of microorganisms;
- B) the ingredients of mineral fertilizers;

- C) heavy metals;
- D) antibiotics;
- E) pesticides.

3. Possible ways of food contamination (indicate one incorrect statement):

A) the migration of toxic substances into food from equipment, utensils, packaging, due to the use of unauthorized non-metallic materials, including polymer, or metals;

B) the formation of endogenous compounds in food products in the process of technological processing - boiling, frying, irradiation, etc .;

C) non-compliance with sanitary requirements for the technology of production and storage of food products, leading to the formation of mycotoxins, botulinum toxins, and other bacterial toxins;

D) the ingestion of toxic substances into food products, including radionuclides, from the environment — the atmosphere, the hydrosphere, and the lithosphere;

E) the formation of exogenous compounds in food products in the process of technological processing - boiling, frying, irradiation, etc.

4. Xenobiotics are called:

A) chemicals of natural origin alien to a living organism;

B) chemicals alien to the living organism of anthropogenic origin;

C) chemicals of natural or anthropogenic origin, alien to a living organism, depending on specific conditions;

D) all chemicals formed in the process of chemical production;

E) the technical term "xenobiotic" for food products is not applicable.

5. Alien chemicals (xenobiotics) do not cause:

A) gonadotropic effect;

B) embryotropic effect;

- C) teratogenic effect;
- D) immunoprotective effect;
- E) mutagenic effect;
- F) carcinogenic effect.

6. From the point of view of toxicity, the following contaminants do not pose the greatest danger (one correct answer):

- A) nitrates, nitrites, nitrosamines;
- B) dioxins and dioxin-like compounds;
- C) polycyclic aromatic hydrocarbons (PAHs);
- D) radionuclides;
- E) food additives of natural origin;
- F) food additives of non-natural origin.

7. The types of hazards of food products are not equivalent in degree of risk, while the greatest potential danger is:

- A) the dangers of microbiological and viral origin;
- B) the danger of a shortage or excess of nutrients;
- C) the dangers of foreign substances from the environment;
- D) the dangers of the natural components of food products;
- E) the dangers of genetically modified organisms;
- F) the dangers of food additives;
- G) the dangers of technological additives;
- H) the dangers of biologically active additives;
- I) the dangers of social toxicants.

### **3. Contamination of food by microorganisms and their metabolites.**

1. For disinfection and deworming of sewage sludge use:

- A) chemical treatment;



- B) physicochemical treatment;
- C) heat treatment;
- D) radiochemical treatment;
- E) electrochemical treatment;
- F) biochemical treatment.

2. It is customary to divide infections caused by wastewater pathogens into 5 categories (identify one incorrect answer):

A) caused by viruses or bacteria that form during high-temperature heat treatment of wastewater containing radionuclides, with the aim of deworming them;

B) caused by viruses, protozoa, some helminths (pinworms, dwarf tapeworm) that infect immediately after isolation;

C) caused by bacteria not only after isolation, but also after prolonged exposure to the environment, for example, cases of cholera epidemic caused by irrigation of crops of untreated sewage;

D) transmitted through the soil by pathogens of intestinal nematodes that do not require an intermediate host for development (ascaris eggs, whipworms, hookworms);

E) caused by the oncospheres of bovine and pork chains, the most common way of these diseases is to irrigate pastures with untreated sewage;

F) caused by helminths, the development of which requires one or more intermediate aquatic hosts (mollusk, fish, aquatic macrophytes), when infection is transmitted through the use of insufficiently treated wastewater in pond farms, provided that raw and thermally untreated fish or aquatic animals enter the diet plants.

3. Food contamination with microorganisms and metabolites causes the following forms of disease (one correct answer):

- A) food poisoning (food intoxication) and food poisoning;

B) food poisoning and food poisoning (food intoxication);  
C) food poisoning and non-food toxicoinfection;  
D) both food and non-food poisoning (all types of poisoning);  
E) food contamination with microorganisms and metabolites in humans does not cause diseases.

4. Food intoxication causes:

A) all known xenobiotics;  
B) all known xenobiotics and some contaminants;  
C) a toxin produced by a microorganism that enters and develops in products;  
D) only staphylococci;  
E) only botulinum toxins A and E.

5. Food intoxication is conditionally divided into:

A) bacterial toxicosis of the first and second groups;  
B) mycotoxicoses of the first, second,  $\alpha$ -fourth and  $\beta$ -third groups;  
C) bacterial toxicosis and mycotoxicosis;  
D) extremely dangerous, dangerous and low hazard;  
E) conditional and unconditional (real and pseudo-real).

6. The most favorable environment for the life of bacteria, incl. staphylococcus is:

A) fruits and vegetables;  
B) grain, bakery and pasta;  
C) canned products in a metal container;  
D) milk, meat and products of their processing;  
E) canned products in a non-metallic container.

7. Food contamination with salmonella can occur:

A) only through meat and meat products, the seeding of which is carried out during the life of animals, and after their slaughter;

B) only through meat and meat products, the seeding of which is carried out during the life of animals, as well as through their milk;

C) only through meat and meat products, which are seeded after slaughter;

D) only through the milk of a sick animal and dairy products based on it;

E) both through animals and through humans, as well as through meat and meat products, which are seeded during the life of animals and after their slaughter, in addition, through milk and dairy products.

#### **4. Загрязнение химическими элементами.**

1. A deficiency in the diet of calcium, iron, pectins, proteins or increased intake of calciferol, the absorption of lead, and, therefore, its toxicity:

A) reduces;

B) does not affect;

C) reduces only in the presence of  $\alpha$ -tocopherol;

D) increases;

E) increases only in the presence of  $\alpha$ -tocopherol.

2. According to FAO, the allowable daily dose (DSD) of lead and its MPC in drinking water are, respectively:

A) DSD - about 0.7 mg / kg body weight, MPC - not standardized;

B) DSD - not standardized, MPC - 0.5 mg / l;

C) DSD and MPC are not standardized;

D) DSD - about 0.007 mg / kg body weight, MPC - 0.05 mg / l;

E) DSD - about 0.007 mg / kg body weight, MPC - 0.05 mg / l (MPC - only for children and diet food).

3. Cadmium enters the human body:

A) with food - 20%, through the lungs from the atmosphere and when smoking - 80%;

B) only with food - up to 100%;

C) with food - 80%, through the lungs from the atmosphere and when smoking - 20%;

D) through the lungs from the atmosphere and when smoking - up to 100%;

E) only when smoking - up to 100%.

4. The FAO / WHO Commission established the allowable daily dose (DSD) of arsenic:

A) 0.05 mg / kg body weight, which for an adult is about 3 mg / day;

B) 0.5 mg / kg body weight, which for an adult is about 30 mg / day;

C) 5 mg / kg body weight, which for an adult is up to 0.3 g / day;

D) 0.05 mg for a person, regardless of his body weight and age;

E) DSD of arsenic has not yet been established.

5. The accumulation of cadmium in the body and the manifestation of its toxic properties (teratogenic, mutagenic and carcinogenic) are most effectively promoted by:

A) all vegetable fats;

B) milk fats;

C) milk proteins;

D) all vegetable proteins;

E) all carbohydrates.

6. A protective effect when exposed to mercury on the human body has:

A) iron, to a lesser extent - lead;

B) lead, to a lesser extent - iron;

C) selenium, to a lesser extent - zinc;

D) zinc, to a lesser extent - selenium;

E) the formation of a non-toxic seleno-mercury complex due to demethylation of mercury in the human body is impossible.

7. The recommended FAO / WHO MPC for mercury in tap water used for cooking is:

- A) quantitatively not standardized;
- B) 5 g / l;
- C) 5 mg / l;
- D) 0.5 mg / l;
- E) 0.005 mg / l.

8. The main targets for exposure to lead are the following body systems, except:

- A) hematopoietic and immune;
- B) nervous and cardiovascular;
- C) the digestive system and kidneys;
- D) sexual;
- E) endocrine.

9. According to the decision of the FAO / WHO Joint Commission on the Food Code, eight chemicals are included among the components whose contents are controlled in international food trade, except:

- A) mercury;
- B) cadmium;
- C) tin;
- D) lead;
- E) arsenic;
- F) copper;
- G) strontium;
- H) zinc;

10. Contamination of food products with arsenic due to its use:

A) in agriculture as a component of some highly effective nitrogen-containing mineral fertilizers;

B) in agriculture as rodenticides (one of the groups of zoocides), insecticides, fungicides, wood preservatives, soil sterilizer;

C) in agriculture as a baking powder of clay soils;

D) in the fuel and energy complex as a fuel oil combustion catalyst (indirect pollution through the atmosphere);

E) in the chemical industry in the production of petroleum-based solvents (indirect pollution through the atmosphere).

### **5. Contamination with substances and compounds used in crop production.**

1. Depending on the form of the nitrogen compound, the following types of fertilizers exist (indicate one incorrect answer):

A) ammonia - nitrogen is present in the form of free ammonia (liquid, aqueous and anhydrous);

B) ammonium - nitrogen is represented by an ammonium ion (ammonium sulfate);

C) nitrate - nitrogen is in the composition of the remainder of nitric acid (sodium and calcium nitrate);

D) ammonium nitrate - contain nitrogen in ammonium and nitrate forms (ammonium nitrate);

E) high-speed - phosphate-potassium;

F) amide - represented by urea - carbamic acid amide, which turns in the soil under the influence of bacteria urease into carbon dioxide ammonium;

G) slow-acting - urea-formaldehyde, urea-aldehyde, isobutylideneurea, oxamide, etc.

2. Pesticides, disrupting the metabolism in plants, the accumulation of nitrates:

- A) weaken 10-20 times;
- B) reinforce 10–20 times;
- C) reinforce 10,000 times;
- D) do not affect;
- E) pesticides do not violate the metabolism in plants.

3. In Russia, permissible concentrations of nitrofurans in foods:

- A) not set;
- B) are absent due to the complete, 100% impossibility of their contamination;
- C) are absent, except for 5-nitro-2-substituted furans, exhibiting increased antimicrobial activity;
- D) are absent, since all nitrofurans have a pronounced bactericidal and bacteriostatic effect;
- E) are established and universally controlled by the relevant official state bodies.

4. Pesticides are divided by toxicity upon single entry into the body through the gastrointestinal tract into (where LD50 is the dose that causes the death of experimental animals), except (one incorrect answer):

- A) potent - LD50 up to 50 mg / kg;
- B) highly toxic - LD50 = 200 mg / kg;
- C) moderate toxic - LD50 from 200 to 1000 mg / kg;
- D) low toxicity - LD50 more than 1000 mg / kg;
- E) non-toxic - LD50 is not limited.

5. According to the cumulative properties (where the cumulation coefficient is the ratio of the total dose of the drug with repeated administration to the dose

that causes the death of animals with a single administration), pesticides are divided into substances having (indicate one incorrect answer):

- A) super cumulation - cumulation coefficient less than 1;
- B) pronounced cumulation - cumulation coefficient 1-3;
- C) moderate cumulation - cumulation coefficient 3-5;
- D) weakly expressed cumulation - cumulation coefficient of more than 5;
- E) the complete absence of cumulative properties.

6. The most dangerous substances of chemical origin used in modern agricultural production, from the point of view of food contamination and negative effects on public health, include:

- A) nitrogen fertilizers containing nitrates;
- B) pesticides;
- C) phosphate and potash fertilizers;
- D) plant growth stimulants;
- E) plant growth inhibitors.

7. According to their persistence, pesticides are divided into (one wrong answer):

- A) very persistent - decomposition time into non-toxic components over 2 years;
- B) persistent - the decomposition time into non-toxic components is 0.5–1 year;
- C) moderately persistent - decomposition into non-toxic components 1–6 months;
- D) low resistance - the decomposition time into non-toxic components is about 1 month;
- E) unstable - the decomposition time into non-toxic components is not more than  $10^{-3}$  hours.



8. The following are not used as pesticides:

- A) organochlorine compounds;
- B) organomercury compounds;
- C) Aurum-containing defoliants;
- D) organophosphorus compounds;
- E) synthetic pyrethroids;
- F) copper-containing fungicides

9. The main crops of commercial transgenic crops in the world are:

- A) soybean, corn, cottonseed oilseed rape;
- B) potatoes;
- C) papaya;
- D) pumpkin, tomatoes;
- E) corn, cotton.

10. The main cause of acute nitrate intoxication is:

- A) the oxidation of nitrates to nitrites, which can occur in foods or the digestive canal;
- B) the restoration of nitrates to nitrites, which occurs only in the digestive canal;
- C) the reduction of nitrates to nitrites, which can occur in food or the digestive canal;
- D) reduction of nitrates to nitrites, which occurs only in food products;
- E) nitrates are methemoglobin formers and, in this regard, have pronounced toxicity, which explains mainly the embryotoxic effect of such compounds.

11. Greenhouse greens from non-greenhouse different nitrate content:

- A) does not differ;
- B) higher due to intensive soil fertilization and lack of lighting;
- C) higher due to intensive soil fertilization and intense lighting;

- D) lower due to lack of soil fertilizer and intense lighting;
- E) lower due to lack of soil fertilizer and lack of lighting.

12. The chronic effect of nitrites leads to:

- A) to reduce the content of vitamins A, E, C, B1, B6 in the body, which leads to a decrease in the body's resistance to the effects of various factors, including oncogenic;
- B) to increase the content of vitamins A, E, C, B1, B6 in the body, which leads to an increase in the body's resistance to the effects of various factors, including oncogenic;
- C) does not lead to a decrease in the content of vitamins A, E, C in the body;
- D) to a noticeable decrease in the content of only B1 and B6 vitamins in the body;
- E) to a noticeable decrease in the content of only vitamin A.

13. The main source of nitrite in the human body are:

- A) products of plant origin, in particular vegetables - up to 90% or more;
- B) polluted atmospheric air - up to 90% or more;
- C) insufficiently purified drinking water from the city water supply - up to 90% or more;
- D) meat products, which account for 53-60% of the total nitrite supply;
- E) fruits, including citrus.

## **6. Contamination with substances and compounds used in animal husbandry.**

1. In order to increase the productivity of farm animals, prevent disease, maintain the good quality of feed in animal husbandry, various feed additives, drugs and chemicals are widely used, except (one incorrect answer):

- A) amino acids;
- B) lead oxides;

- C) mineral substances;
- D) enzymes;
- E) antibiotics;
- F) tranquilizers;
- G) antibacterial substances;
- H) antioxidants;
- I) flavorings;
- J) hormonal drugs.

2. The main targets when exposed to lead are the following body systems, except:

- A) hematopoietic and immune;
- B) nervous and cardiovascular;
- C) the digestive system and kidneys;
- D) sexual;
- E) endocrine.

3. The anabolic effect of synthetic hormonal drugs compared with natural hormones:

- A) 2 times or more effective;
- B) 10 times or more efficient;
- C) 100 times and more efficient;
- D) 100 times less effective;

E) the synthesis of hormonal drugs with the current level of development of science and technology is impossible.

4. The use of drugs and feed additives in veterinary medicine, animal husbandry and poultry farming requires compliance with certain hygiene rules, which can actually be achieved:

- A) a complete, absolute prohibition of their use, incl. for commercial

purposes;

- B) increasing the moral responsibility of food producers;
- C) the use of fast and reliable instrumental analytical methods for controlling residual amounts of contaminants in food;
- D) using organoleptic control methods - the appearance of food products, their color, smell, etc .;
- E) by restricting the supply of foreign livestock and poultry products.

5. Can it be argued that the systematic use of food contaminated with antibiotics, nitrofurans, sulfonamides, hormonal drugs, leads to the emergence of resistant forms of microorganisms, is the cause of various allergic reactions and dysbacterioses in humans:

- A) no;
- B) yes;
- C) only in relation to nitrofurans;
- D) only in relation to synthetic hormonal drugs;
- E) I do not know.

6. Hormonal drugs are not used in veterinary medicine and animal husbandry with the aim of:

- A) stimulation of animal growth;
- B) improving taste;
- C) improving the digestibility of feed;
- D) multiple pregnancy;
- E) regulation of the duration of pregnancy;
- F) accelerate puberty.

7. The hormonal preparations with pronounced anabolic activity and used in this regard for fattening livestock and poultry do not apply (indicate two of the following):

- A) polypeptide and protein hormones (insulin, growth hormone, etc .;
- B) derivatives of amino acids - thyroid hormones;
- C) steroid hormones, their derivatives and analogues;
- D) tocopherols;
- E) antibiotics.

8. In Russia, the content of sulfonamides in food products and food raw materials with medical and biological requirements:

- A) not regulated;
- B) is regulated;
- C) not regulated, except for baby and diet food;
- D) is regulated only by sulfapyridine and sulfamethazine;
- E) is regulated within the framework of individual regions solely on their initiative.

9. Antibiotics in the meat and milk of animals, in the eggs of birds, as well as in other products go:

- A) can, while having a predominantly allergic effect;
- B) they cannot;
- C) can in trace amounts, without exerting any effect on a person;
- D) they can, but at the same time tylosin, furans and polymyxins, as well as tetracyclines, have no toxic effect on humans;
- E) they can, but penicillin does not have a toxic effect on humans.

## **7. Biomedical criteria for assessing the safety of the use of genetically modified foods.**

1. Transgenic organisms are:

- A) only plants whose genetic program is modified using genetic engineering methods;

B) only animals whose genetic program is modified using genetic engineering methods;

C) only microorganisms whose genetic program is modified using genetic engineering methods;

D) only viruses whose genetic program is modified using genetic engineering methods;

E) animals, plants, microorganisms, viruses, the genetic program of which is modified using genetic engineering methods.

2. In the case of using genetically modified organisms, integral risk is:

A) the likelihood of undesirable effects of the genetically modified organism on the environment;

B) the probability of the undesirable effects of a genetically modified organism on the conservation of biological diversity;

C) the probability of the undesirable effects of a genetically modified organism on human health due to the transfer of foreign genes;

D) the likelihood of the undesirable effects of the genetically modified organism on the conservation of biological diversity, including human health, due to gene transfer;

E) the likelihood of an undesirable effect of a genetically modified organism on other organisms of this species.

3. The largest areas under transgenic cultures are occupied:

A) in Argentina - more than 70% of the total area;

B) in Canada - more than 70% of the total area;

C) in China - more than 70% of the total area;

D) in the USA - more than 70% of the total area;

E) in South Africa, Mexico and Spain - more than 70% of the total area (total).

4. The main crops of commercial transgenic crops in the world are:

- A) soybean, corn, cottonseed oilseed rape;
- B) potatoes;
- C) papaya;
- D) pumpkin, tomatoes;
- E) corn, cotton.

5. Definition: "A genetically engineered (genetically modified) organism is an organism or several organisms, any non-cellular, unicellular or multicellular formation capable of reproducing or transmitting hereditary genetic material, different from natural organisms, obtained using genetic methods engineering and containing genetic engineering material, including genes, their fragments or combinations of genes ":

- A) not true;
- B) true;
- C) true, but only partially;
- D) true, but outdated and does not meet the modern generally accepted definition;
- E) true, but not completely given.

6. Commercial profits from the cultivation of transgenic crops over the past five years:

- A) increased approximately 2 times;
- B) increased by more than 30 times;
- C) remained virtually unchanged;
- D) decreased by about 2 times;
- E) decreased by more than 30 times.

7. The toxicological characteristics of genetically modified food sources do not determine the following indicator:

- A) toxicokinetics;
- B) genotoxicity;
- C) potential allergenicity;
- D) potential colonization in the gastrointestinal tract (in the case of the content of live microorganisms in a genetically modified source);
- E) potential colonization in the gastrointestinal tract (in the absence of living microorganisms in the genetically modified source);
- F) the results of a subchronic (90 days) toxicological experiment in laboratory animals and studies on volunteers.

8. Among the main features controlled by transferred genes in transgenic organisms in the first place:

- A) resistance to herbicides - more than 70%;
- B) resistance to pests - more than 70%;
- C) resistance to both herbicides and pests - more than 70%;
- D) resistance to viral, bacterial and fungal diseases - more than 70%;
- E) resistance to defoliants - more than 70%.

9. Clone - the main unit of account in the genetics of microorganisms is:

- A) a population of cells descended from a common ancestor by asexual reproduction;
- B) a population of organisms descended from a common ancestor through asexual reproduction;
- C) a population of cells or organisms derived from a common ancestor;
- D) a population of cells or organisms that have occurred through asexual reproduction;
- E) a population of cells or organisms descended from a common ancestor by asexual reproduction.



10. In the USA, if food products from genetically modified organisms or containing them as components are recognized as safe, then in a special label it:

- A) needs;
- B) does not need;
- C) needs, but only insufficiently hygienically studied products;
- D) does not need, but is carried out by the seller at the first request of the consumer;
- E) such information is not provided in the media.

**8. Dioxins and polycyclic aromatic hydrocarbons are potentially dangerous food contaminants. Radioactive contamination of food raw materials and food products.**

1. Currently identified carcinogenic representatives of polycyclic aromatic hydrocarbons (PAHs):

- A) more than 200;
- B) more than 20;
- C) no more than 2;
- D) the identification of such complex polycyclic compounds is technically impossible;
- E) the identification of such compounds is technically possible, but not carried out, since it has neither scientific nor practical meaning.

2. Dioxins enter the human body:

- A) mainly with drinking water (98–99% of the total dose);
- B) mainly when breathing polluted air in large industrial cities (98–99% of the total dose);
- C) mainly with food (98–99% of the total dose);
- D) only with livestock products contaminated with nitrites;
- E) only with crop products contaminated with nitrates.

3. Sources of pollution by dioxins are not:

- A) enterprises of the metallurgical industry;
- B) pulp and paper industry enterprises;
- C) machine-building enterprises of assembly profile;
- D) enterprises of the petrochemical industry;
- E) incinerators for the disposal of municipal solid waste;
- F) urban vehicles;
- G) pesticide manufacturing enterprises;
- H) thermal power plants.

4. The content of dioxins in cow's milk:

- A) 40-200 times higher than in the tissues of the animal;
- B) 40-200 times lower than in the tissues of the animal;
- C) the same as in the tissues of the animal;
- D) not higher than in the tissues of the animal;
- E) not lower than in the tissues of the animal.

5. Sources of contamination of food raw materials and food products with radionuclides cannot be:

- A) nuclear weapons tests;
- B) mining and processing of uranium and thorium ores;
- C) enrichment of uranium with the  $^{235}\text{U}$  isotope, i.e. obtaining uranium fuel;
- D) radio waves;
- E) the operation of nuclear reactors;
- F) reprocessing of nuclear fuel in order to extract radionuclides for the needs of the national economy;
- G) storage and disposal of radioactive waste.

6. The livestock products of radionuclides contain:

A) 2-4 orders of magnitude higher than in crop production, i.e., if the collective dose for the consumption of vegetables and root crops is taken as 1, then

the population dose for milk consumption will be 100–1000;

B) 2–4 times more than in crop production, that is, if the collective dose for the consumption of vegetables and root crops is taken as 1, then the population dose for milk consumption will be 2–4;

C) 2-4 orders of magnitude less than in crop production, i.e., if take the population dose for milk consumption as 1, then the collective dose for the consumption of vegetables and root crops will be 100–1000;

D) 2-4 times less than in crop production, that is, if the population dose for milk consumption is taken as 1, then the collective dose for the consumption of vegetables and root crops will be 2-4;

E) radionuclides cannot be contained in animal products.

7. The population living in areas adjacent to sources of environmental pollution by radionuclides, the main contribution to the total supply of radionuclides is made by:

A) livestock products;

B) vegetable products (mainly cabbage and potatoes);

C) does not depend on the type of food product, but depends on its consumed volume;

D) fruit;

E) fish and its processed products.

8. An important factor in preventing the accumulation of radionuclides, especially long-living, in the body of people working or living in areas contaminated with accidental releases, is the use of certain foods, which helps to reduce the risk of cancer:

A) enrichment of the diet with fish mass, calcium, bone meal, fluorine,

laminaria, indigestible carbohydrates, as well as  $\beta$ -carotene and foods with a high content of this provitamin;

B) enrichment of the diet with vegetables, mainly root crops, with a high content of vitamin C;

C) enrichment of the diet with fruits, mainly having an acidic taste, such as, for example, lemon, green apples, etc .;

D) enrichment of the diet with various cereal products, as well as fruits and some vegetables, which have a laxative effect;

E) enrichment of the diet with fiber, as well as essential amino acids and iron.

9. The main part of dioxins is cumulated:

A) in the terrestrial parts of plants and only 10% - in root systems;

B) in the root systems and terrestrial parts of plants is almost the same;

C) in the root systems of plants and only 10% - in the ground parts;

D) only in the root systems of plants;

E) only in the terrestrial parts of plants.

### **9. Metabolism of foreign compounds.**

1. The main ways of contamination of food and food raw materials (indicate one incorrect answer):

A) the use of unauthorized dyes, preservatives, other food additives or their use in high doses;

B) the use of tested unconventional food production technologies or individual new food ingredients;

C) pollution of crops and livestock products with pesticides;

D) violation of hygienic rules for the use of fertilizers in crop production, as well as industrial and domestic wastewater;

E) the use in animal husbandry and poultry of unauthorized feed additives,

preservatives, growth stimulants, preventive and therapeutic drugs, or their use in high doses.

2. Once in the human body, radioactive elements:

A) are distributed in organs, tissues and are excreted from the body to an unequal extent;

B) are distributed in organs, tissues and are equally excreted from the body;

C) are distributed in organs, tissues and are not excreted from the body throughout a person's life;

D) are distributed only in human organs and gradually uniformly removed from the body;

E) are distributed only in human tissues and are gradually excreted from the body.

3. The precursors for the endogenous synthesis of nitrosoamines in the human body are:

A) phosphates, carbonates and sulfates contained in foods;

B) permanganates contained in food products;

C) nitrates and nitrites contained in food products;

D) nitrates contained in atmospheric air;

E) nitrates and nitrites contained in atmospheric air.

4. If dioxins are released into the environment:

A) intensively accumulate in soil, water bodies, actively migrate along food chains, especially in its fat-containing objects;

B) decompose in water during the day, are not able to migrate along food chains;

C) decompose in the atmosphere within a month, practically do not migrate along food chains;

D) in all environments they decompose during the year, do not dissolve in

fats, are readily soluble in water, practically do not migrate along food chains;

E) in the soil, in the presence of humus, they instantly completely lose their activity and toxicity, otherwise they decompose within a month and are not able to migrate along food chains.

5. To enterosorbents (detoxicants) that are able to effectively bind and remove heavy metals, pesticides, nitrates, nitrites and other toxic substances from the body, both from outside and from inside, do not include:

A) activated carbon;

B) pectins;

C) lignins;

D) fructose;

E) gums;

F) cellulose.

## **10. Anti-nutritional nutritional factors.**

1. Alcohol is:

A) polyhydric alcohols;

B) monohydric alcohols, organic compounds containing a hydroxyl group, OH at a saturated carbon atom;

C) monohydric alcohols, inorganic compounds not containing a hydroxyl group, OH at the saturated carbon atom;

D) all monohydric and polyhydric alcohols;

E) inorganic compounds containing a hydroxyl group, OH.

2. The nutrition of people who use social toxicants - drugs, tobacco and alcohol, is significantly changing for the worse, because:

A) many chemical compounds that make up food products,

interacting with metabolic products in the body, exposed to the above social toxicants, also become toxic;

- B) these people in an altered state of consciousness can eat poor-quality (or generally unsuitable for food) food products;
- C) due to their lack of funds for quality food products;
- D) only because of the occurrence of synergy in this case;
- E) only because of the complete absence in this case of the phenomenon of synergism.

3. Two standard Coca-Cola bottles are approximately equivalent in caffeine content:

- A) 0.05 ml of coffee;
- B) 10 ml of coffee (one teaspoon);
- C) 150 ml of coffee (one cup);
- D) Coca-Cola does not contain caffeine;
- E) the question does not make sense.

4. Alcoholic beverages can be attributed to anti-nutritional factors:

- A) no;
- B) yes;
- C) yes or no - depending on the percentage of alcohol in the drink;
- D) yes or no - depending on the volumetric alcohol content in the drink;
- E) I do not know.

5. The anti-nutritional natural factors include:

- A) compounds of anthropogenic origin with general toxicity and the ability to selectively degrade or block the absorption of nutrients;
- B) compounds of natural and (or) anthropogenic origin that have general toxicity, but are not able to impair or block the absorption of nutrients;

C) compounds of natural origin, not possessing general toxicity, but possessing the ability to selectively impair or block the absorption of nutrients, for example, antienzymes, anti-vitamins, demineralizing substances;

D) all synthetic chemical compounds that do not have the ability to impair or block the absorption of nutrients;

E) all synthetic chemical compounds with the ability to impair or block the absorption of nutrients.

6. According to modern concepts, anti-vitamins include:

A) compounds of various nature, with the ability to reduce or completely eliminate the specific effect of vitamins, regardless of the mechanism of action of these vitamins;

B) substances that reduce the body's need for vitamins;

C) compounds that are not able to modify vitamins;

D) fats (saturated, polyunsaturated and monounsaturated fatty acids);

E) compounds opposite the antimetabolites by the mechanism of action.

7. The adverse natural compounds in food products, the excess intake of which may adversely affect human health, do not include:

A) lectins contained in legumes;

B) cyanogenic glycoside limarin contained in white beans;

C) cyanogenic glycoside of amygdalin contained in peach stones, apricots, other fruits;

G) glycoalkaloids - solanine and chaconin, which are formed in potatoes, under certain conditions of ripening and storage, as well as in eggplant, tomatoes and tobacco;

D) patulin produced by penicilli and aspergillus.

8. Anti-nutritional nutritional factors:



a) substances that do not have general toxicity, but which can selectively degrade or block the absorption of nutrients;

b) substances that do not have toxicity;

c) substances that are not able to block the absorption of nutrients.

9. Antivitamins:

a) substances that inactivate vitamins;

b) substances that do not inactivate vitamins;

c) compounds that are chemical analogues of vitamins, with the replacement of any functionally important group by an inactive radical.

10. Inhibitors of digestive enzymes:

a) substances of protein nature;

b) substances capable of inhibiting the proteolytic activity of certain enzymes;

c) substances of protein nature, lowering the activity of digestive enzymes.

11. Lectins:

a) substances of protein nature;

b) a group of substances of a glycoprotein nature with a molecular weight of less than 60,000 daltons;

c) a group of substances of a glycoprotein nature with a molecular weight of from 60,000 to 120,000 daltons.

12. Glycoalkaloids:

a) compounds containing the same aglycon (solanidine);

b) compounds containing various sugar residues;

c) compounds whose molecules contain the same aglycone (solanidine), but different sugar residues.

## **11. Food and biologically active additives, their classification and characteristics.**

### 1. Classification of food additives

- 1) dyes, preservatives, antioxidants, emulsifiers, corrective substances;
- 2) nutraceuticals and parapharmaceuticals;
- 3) probiotics and prebiotics.

### 2. The importance of flavoring substances in nutrition:

- 1) increase the shelf life of food;
- 2) improving the consistency of food;
- 3) improving the process of digestion of food.

### 3. Prebiotics are:

- 1) food substances that selectively stimulate the growth and (or) biological activity of representatives of the protective intestinal microflora, thereby contributing to the maintenance of its normal state and biological activity;
- 2) biologically active food additives, which include live microorganisms and (or) their metabolites, which have a normalizing effect on the composition and biological activity of the microflora of the digestive tract;
- 3) food products containing ingredients that benefit human health by improving many physiological processes in the body.

### 4. What are the functions of dietary supplements?

- 1) filling the lack of substances necessary for man; regulation and normalization of the physiological functions of the body; excretion of waste products and toxic substances from the body;
- 2) improving the taste and aesthetic properties of food;
- 3) increase the shelf life of food.

## 5. What are dietary supplements?

1) concentrates of natural or identical to natural biologically active substances intended for direct intake or introduction into the composition of food products in order to enrich the human diet with individual biologically active substances or their complexes;

2) food products containing ingredients that benefit human health by improving many physiological processes in the body;

3) food products developed for healthy people with certain physiological needs associated with the functional state of the body or lifestyle.

## 6. What groups are biologically active food additives divided into?

1) nutraceuticals and parapharmaceuticals;

2) food coloring and flavoring;

3) probiotics and prebiotics.

### **Criteria for assessing students' knowledge during testing**

The mark "excellent" is set provided that the student answers correctly at least 90% of the test tasks;

A rating of "good" is set if the student answers correctly, at least 80% of the test items;

The grade "satisfactory" is set if the student answers correctly at least 61%; .

The grade "unsatisfactory" is set if the student answers correctly in less than 60% of the test items.

### **Situational task 1.**

The laboratory accepted a sample of semi-finished meat products from pork meat. The recess was made in the dining room of the pioneer camp during an unscheduled examination. The survey revealed that the head. I bought three pork

carcasses slaughtered on suspicion of a viral disease (swine fever) at a nearby collective farm.

Bacterioscopy: a significant number of gram-negative small rods were found in imprint preparations from connective tissue layers from the surface and incision of the lymph node. When identifying, microorganisms belong to the Salmonella group.

### **Situational task 2.**

A sample of pork meat was taken to the laboratory. The sample was removed from the working dining room of a furniture factory during a routine examination.

The reasons for the extraction of the sample - the presence on the pork carcasses of a red triangular stamp with the designation "for sanitation".

When the sample was cut deep in muscle tissue, whitish formations the size of a small pea were found. On an area of 40 cm<sup>2</sup> there are 2-3 such formations. Microscopic examination reveals a characteristic structure for Finnish tapeworms, inside the bubble is visible the head of the parasite with suction cups and hooks. When examined in a solution of bile, the Finns are viable.

### **Situational task 3.**

A sample of beef meat was taken to the laboratory. A sample was taken by a food hygienist from the dining room of the vocational school No. 3 due to an unscheduled examination.

In the section, muscle tissue contains dense inclusions in the form of oval bubbles, the size of a grain of wheat. In areas of 40 cm<sup>2</sup>, 8-10 such formations are found. A characteristic structure is found for the Finnish tapeworms, inside the vesicle, the moving head of the parasite without hooks is visible. Finns are viable.

#### **Situational task 4.**

A freshly frozen pike sample was received at the laboratory. The sample was removed from the Solnechnoye cafe at the request of the cafe's storekeeper.

In the abdominal cavity of the fish, in sections of the back under the skin, larvae of a milky color 1-2 cm long with a wider front end were found - plerocercoids of a wide ribbon. Larvae are motile.

#### **Situational task 5.**

A sample of dried fish seized from the canteen was received at the laboratory in Tselinograd.

On examination of the muscle tissue during examination, dense nodules the size of millet grain are noted.

Under the microscope, the presence of single metacercaria larvae of cat fluke was established. Metacercaria are viable.

#### **Situational task 6.**

The laboratory received a sample of pasteurized flask milk, seized during milk reception in the canteen of the boarding school from an unsealed flask.

Analysis Results:

Appearance - a liquid of uniform consistency;

Color - yellow with a slightly bluish tint;

Smell - with an unusually turnip-herbal shade;

Taste - not determined.

Physical and chemical indicators:

Acidity - 19 ° T;

The fat content is 1.3%.

Bacteriological indicators:

The total number of bacteria in 1 ml is 1,450,000;

BGKP (E. coli) - presence in 0.1 g.

No pathogens were found.

### **Situational task 7.**

A laboratory study of flour revealed the following:

Ergot content - 0.04%;

Smut content - 0.02%;

Cockle content - 0.01%;

The content of metal impurities is 2 mg / kg;

The moisture content is 13%.

There are no barn pests.

### **Situational task 8.**

A sample of canned fish “Sprat in Tomato Sauce” was delivered to the laboratory of the Center for Hygiene and Epidemiology.

Sample taken from the warehouse of the diner number 3.

The number of samples - 10 cans of 350 g.

Analysis Results:

Appearance; no bombing, no leakage. Cans made of unvarnished tin, not deformed. Traces of rust on the outside and on the inner unvarnished surface of the cans.

Physical and chemical indicators:

Acidity in terms of malic acid - 0.9%;

The content of salt is -2.4%;

The content of tin salts is -250 mg / kg;

The content of copper salts is 8 mg / kg;

The content of lead salts is 10 mg / kg.

**Assessment of test items with the choice of one correct answer:**

100% correct answers - “excellent rating”

75% of correct answers - “rating is good”

50% of correct answers - “rating is satisfactory”

Less than 50% of correct answers - “rating is unsatisfactory”

**Criteria for evaluation:**

12 points are awarded to the student if he made no more than 1 error.

9 points are given to the student if he made 2-3 mistakes.

7 points are awarded to the student if he made 4-5 mistakes.

5 points are awarded to the student if he made more than 5 errors..

**Answers to test items**

	<b>TEST 1</b>	<b>TEST 2</b>	<b>TEST 3</b>	<b>TEST 4</b>	<b>TEST 5</b>	<b>TEST 6</b>	<b>TEST 7</b>	<b>TEST 8</b>	<b>TEST 9</b>	<b>TEST 10</b>
1	A	E	C	D	E	B	E	A	B	B
2	A	B	A	D	B	E	D	C	A	A
3	A	E	A	C	A	C	D	C	C	C
4	BCD	B	C	A	E	C	A	A	A	B
5	A	D	C	C	E	B	B	D	D	C
6	A	E	D	C	B	B	B	C		A
7	C	A	E	E	E	DE	E	B		E
8	AB			E	C	A	A	A		A
9				C	A	A	E	C		A
10				B	C		B			B
11					B					C
12					A					C
13					D					